THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The stock market end of the iron trade still dominates the situation. Nothing has developed in respect to production or consumption to lead those actually in the business to take as unfavorable a view of the present or the future as is reflected from Wall Street. With excellent philosophy the average producer of pig iron or of finished material is adjusting his plans to a slowing down after two years of pell-mell rush. The fact that the blast furnace interests of three important districts have agreed to cut down output and have actually entered on the restrictive program with a unanimity never known in similar attempts, is taken as the best promise that the situation will prove amenable to correction and will not go to the point of demoralization. The rate of production has already been substantially reduced, and both buyer and seller are hopeful that the decline in pig iron will be arrested close to the present stage, for foundrymen find that a pig iron decline is often followed by a worse one in the price of castings. The situation as to Southern iron is still rather obscure, and there are conflicting reports as to the actual market policy of the association furnaces. As heretofore, independent furnaces have sold iron in Central Western territory at $10.75 for No. 2 at furnace and transactions at $10.50 have been authenticated. Such prices have taken business from Northern furnaces in some instances, the latter as a rule making $14.50 at furnace their minimum. Virginia furnaces have secured a reduction in freights corresponding to that which is effective October 15 on Alabama irons. At Pittsburg some low-priced sales of foundry iron have been made by coke dealers who had taken iron in trade. Small or moderate orders and early shipments are the rule, and while foundry operations are slackening the curtailment of consumption is not pronounced. That some of the stock at Southern furnaces may yet go abroad as ballast for cotton cargoes is not improbable. A freight rate of $2.50 to $3 from the furnace to Manchester docks, for example, was made during the last export movement. Recent offers of Southern iron have been made at 55s or $13.35 at Manchester, while Middlesboro iron is sold at $12.50 to $12.75 Manchester. In the East there has been some turning from the making of foundry iron to low-phosphorus and basic irons, while in the Central West the make of Bessemer iron has been greatly curtailed and the relative production of foundry iron has increased. Actual production is of course less, through the banking or slower operation of stacks. In the Mahoning and Shenango Valleys the number of idle furnaces has been increased to 10 in the week. The steel market is dull, with offerings by independent interests $1 to $2 below the $27 mill basis of the billet association. The announcement that the Clairton Steel Co. deal has fallen through causes speculation as to the amount of steel from Clairton that will now be available for independent finishing plants. Clairton interests are at present parties to the billet agreement, however. In the past week the closing down of two or three steel corporation plants, including Joliet and some Homestead departments, has accented the slowing down process, but these shut-downs are said to be a matter of a week or so. Meanwhile preparations are made for resumption at South Sharon. Some business in rails is pending and additional structural business is reported in the East, the American Bridge Co. closing 8,000 tons in addition to 20,000 tons last week. The Pencoyd works have taken the contract for the Pennsylvania terminal at Washington. Bar iron has made a new low level both in Central Western and Eastern markets, and renewed effort is reported toward a combination of independent Western mills.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Oct. 14.

The pig iron production of the Pittsburg and Valley districts is already being curtailed by the banking and blowing out of furnaces. During the week the list of idle stacks in the Mahoning and Shenango Valleys was increased to ten, by the blowing out of two merchant furnaces and one of the stacks of the Republic Iron & Steel Co. One merchant furnace in Pittsburg continues idle, while production at the stacks of the United States Steel Corporation in the Wheeling and Pittsburg districts has already been considerably curtailed. The production of coke in the Connellsville region is also being curtailed in sympathy with the pig iron movement, and at the present time no less than 5,000 ovens in the upper and lower Connellsville region are out. With the still further reduction of pig iron output there will be a further putting out of coke ovens, and the weekly production, already reduced 50,000 tons, will probably be cut down 25,000 tons more. As yet the banking of the furnaces has had no appreciable effect on the market and it may be close to the first of the year before the beneficial results of this movement will be felt. While there is practically no market for Bessemer iron, offerings in the week have been at $15 at furnace, while sales of Northern No. 2 have been made at $14.50 to $14.75, Pittsburg. These sales were not made by furnaces, however, but by coke dealers, who in order to protect high priced coke took their payment in pig iron, and then offered the product at extremely low prices to secure a quick disposal. There is no demand for forge iron and the market remains nominally $14, Pittsburg.

The failure of the United States Steel Corporation to purchase one-half interest in the Clairton Steel Co. as proposed last July, again places the latter concern in the market as a powerful independent producer, and it is stated that sheet and tin bar mills will probably be added to supply the independent sheet and tin mills of the country. The Clairton Steel Co. will not revert to the Crucible Steel Co. of America as a subsidiary company, but will probably be financed independently. This may be done within the next few days. The report that the Clairton Steel Co. would withdraw from the billet association on account of the refusal of the United States Steel Corporation to purchase the property is officially denied.

The quotations of the billet association are now being openly shaded from $1 to $2 per ton on open-hearth steel by small independent producers not affiliated with the as-

sociation, but quotations on Bessemer steel are being firmly maintained. Lower quotations are expected by the trade from the steel mills, but it is doubtful if any reductions will be made for the present at least as there is practically no demand.

A meeting of the plate manufacturers was held in New York last Thursday and prevailing quotations were reaffirmed. While none of the plate mills in the pool have been reported shading quotations, it is claimed that some mills rolling wide skelp have done this on desirable orders. The buying of steel bars continues in small lots for immediate delivery, and the bar iron market continues to show additional weakness. Sales have been reported during the week at 1.40c to 1.45c, Pittsburg, and should prices continue to drop the prevailing quotations on steel bars will be affected. Structural material continues quiet as well as sheets and tin plate, but the pipe and tube trade of the National Tube Co. continues to hold up extremely well.

Pig Iron.—During the week the Laura stack of the Republic Iron & Steel Co., at Haselton, O., Mary at Lowellville, O., and the Alice at Sharpsville, Pa., were blown out pursuant to the curtailment program already outlined. At Sharpsville the Mabel and No. 3 of the Shenango Furnace Co., are out for repairs, while one of the Andrews & Hitchcock stacks at Hubbard, O., continues idle. The Carnegie Steel Co. has two stacks idle at Sharon and one at Youngstown, O., while another at New Castle is being torn down. A number of the steel corporation furnaces in this and the Wheeling districts are also banked at present, and the idle list will probably be added to in the near future. Coke dealsr, in order to protect pending contracts, have taken iron in a number of cases from furnaces and disposed of the iron at cut prices, on the tracks in Pittsburg. Carload lots of No. 2 have sold as low as $14.50 and $14.75, and one offer of $14.35 was made by a dealer for a 500 ton order. The sale has not been made, however. There are no transactions in Bessemer iron, although there are reports of offers as low as $15 at the furnace. Forge iron is quoted nominally at $14, Pittsburg. We revise quotations as follows:

Bessemer, Valley	$15 25 to 16 00
Bessemer, Pittsburg	16 10 to 16 85
No. 1 Foundry	15 50 to 15 75
No. 2 Foundry	14 75 to 15 25
Gray Forge, Pittsburg	14 00 to 14 50
Chilled Basic, Valley	15 50 to 15 75
Chilled Basic, Pittsburg	16 35 to 16 60

Steel.—The billet association's quotations on open-hearth steel are being shaded from $1 to $2 per ton, but on Bessemer iron the quotations are being firmly maintained. There are few transactions, and sales are limited almost entirely to carload lots. One lot of 3,000 tons of billets and sheet bars is to be disposed of the latter part of this month by auction, being a portion of an unfilled order that a finishing mill could not take out. This is the first sale of this kind for some time, as only six months ago the mill or dealer selling this steel would have had no difficulty in disposing of the same. We quote association prices as follows: Bessemer billets 4x4 inches and slabs up to and including .25 carbon, $27, Pittsburg, Wheeling or Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; .26 to .60 carbon, $1 advance, and .61 to 1.00 carbon, $2 advance; open-hearth billets up to and including .60 carbon, $28, and over .60 carbon, $29; billets smaller than 3⅞-inch and sheet and tin bars are $1 per ton extra; Bessemer rods, $35.50 to $36 and open-hearth are held at $1 advance.

Ferro-Manganese.—Both domestic and foreign manganese, 80 percent, in 50 ton lots and over is held at $48 delivered at buyer's mill, East of the Mississippi river. Carload lots are quoted $48.50 to $49.

Spelter.—The market continues quiet and prime Western grades are quoted 5.58½c to 5.60c, delivered, Pittsburg, in carload lots.

Muck Bar.—The market continues extremely quiet and prime muck is nominally $27.50 to $28.50.

Skelp.—There is little buying of either iron or steel skelp, and both grooved and sheared iron skelp are 1.65c to 1.70c, Pittsburg, while steel skelp is held at 1.60c to 1.65c.

Rails and Track Material.—Some good-sized orders for rails are reported pending. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 8 pounds, in carload lots, $39; less than carload lots, $40; 12 pounds, $32 to $32.50; 16 and 20 pounds, $30.50 to $31; 25 to 40 pounds, $30. Track material: Spikes, 2.05 to 2.10c; track bolts, square nuts, 2.50c; hexagon nuts, 2.65c; fish plates, 1.60c on orders accompanying large rail contracts, otherwise 2c to 2.10c is asked.

Bars.—The buying of steel bars continues in small lots only for immediate delivery, as consumers are not covering for future requirements. Further low prices are reported on iron bars, and 1.40c to 1.45c is the prevailing Pittsburg delivered quotation. We quote as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.70c; over 3 inches, 1.80c; common bar iron, 1.40c to 1.45c, Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots.

Plates.—A meeting of the plate manufacturers was held in New York last Thursday and prevailing quotations were reaffirmed. While none of the mills in the association are reported cutting prices, some of the narrower sizes of plates that can be rolled on skelp mills are being shaded on desirable orders. The plate trade continues very quiet. We make the following quotations: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plate 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Structural Material.—There is little new business being placed and the output of the local mills continues to be curtailed. We make the following quotations: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—While the demand for sheets continues fair, the jobbers are not filling out their stocks, anticipating lower prices. Quotations which have been ruling for some time are being well maintained, however. Black sheets in 500-bundle lots and over are held as follows: No. 28, 2.65c to 2.70c; No. 27, 2.55c to 2.60c; No. 26, 2.45c to 2.50c; Nos. 22 and 24, 2.35c to 2.40c; Nos. 18 and 20, 2.25c to 2.30c; Nos. 14 and 16, 2.15c to 2.20c; Nos. 10 and 12, 2.05c to 2.10c. Galvanized: No. 16, 2.55c to 2.60c; No. 18-20, 2.80c to 2.85c; No. 22-24, 3.05c to 3.10c; No. 25-26, 3.30c to 3.35c; No. 27, 3.55c to 3.60c; No. 28, 3.80c to 3.85c; No. 29, 4.30c to 4.35c; No. 30, 4.45c to 4.50c.

Pipes and Tubes.—The National Tube Co. continues to report a very good demand for its product, despite the lull in other lines. The independent pipe manufacturers are quoting 2½ percent below the National Tube Co. and it is reported that the recent agreement entered into by the independents is not being firmly maintained. We quote as follows in carload lots to consumers, f. o. b. Pittsburg, plus freight according to Tube Rate Book to destination:

MERCHANT PIPE.	Steel Pipe.		Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	69	59	66	56
Plugged and Reamed				
1 to 4 inch	73	63	70	60

Extra Strong Plain End				
⅛ to 8 inch	67	57	63	53
Threads only	66	56	62	52
Threads and Couplings	65	55	61	51
Double Extra Strong Plain End				
⅛ to 8 inch	59	49	55	45
Threads only	58	48	54	44
Threads and Couplings	57	47	53	43

NOTE.—Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent.
1 to 1½ inches	45
2¼ to 5 inches	62½
1¼ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	36½
2¼ to 5 inches	45½
1¼ to 2¼ and 6 to 13 inches	35½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3½ to 4 inches	60
4½ to 12½ inches	62

Wire and Wire Nails.—The demand for all kinds of wire products is good, although some cutting is reported on cut nails. While prevailing quotations were recently affirmed by cut nail manufacturers, it is reported that some of the mills are offering concessions. We quote as follows: Wire nails, carload lots, to jobbers, f. o. b. cars, Pittsburg, $2; plain wire, carload lots, $1.90; barb wire, carload lots, $2.30; staples, carload lots, $2.20. Galvanizing 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $2.15, and less than carload lots, $2.20, f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $2.25 in carload lots and $2.30 in less than carload lots. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—Orders for the higher grades of steel are numerous, but the tonnage is small, indicating that consumers generally are buying for immediate needs only. The shafting market continues very quiet, and as new construction is practically at a standstill this trade is very light. We quote: Turned cold rolled and ground shafting, 47 off in carload lots and 42 percent off in less than carload lots. Tire steel, 2.15c to 2.25c; spring steel, 2.25c to 2.35c; toe calk, 2.30c to 2.40c. Tool steel is quoted 7 cents and upwards, according to the grade.

Old Material.—A wide range of prices is quoted by mills with material to offer and by the dealers. A few small sales of cast scrap have been reported at $14.50, Pittsburg, gross, but as the foundry iron market continues to recede still lower prices are expected for this material. Heavy melting stock has sold at $15 to $15.50, Pittsburg, while sales of sheet scrap have been reported as low as $7.50.

Coke.—According to the Connellsville Courier, for the week ending Saturday, Oct. 3, there were 4,662 of the 25,590 ovens in the upper Connellsville region idle, while of the 5,148 ovens in the lower region 642 are idle. The production of the upper region amounted to 205,120 tons, while that of the lower region was 51,555 tons. Additional ovens in both regions will go out during the next few weeks and it is probable that the production of the entire region will be curtailed from 50,000 to 75,000 tons weekly. Strictly Connellsville furnace coke is held at $2.10 to $2.25, while foundry is held at $2.50 to $3.00. Outside furnace coke is held at $1.50 to $1.90 and foundry at $2 to $2.50.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, Oct. 13.

The principal feature of interest in this market is the renewed actively for rails. Within the week, railroads have entered the market for a round lot of standard sections, of which the Illinois Steel Co. secured 20,000 tons and Eastern makers the balance. Several smaller contracts for rails, ranging from 500 to 2,000 tons, have been closed, in addition to the foregoing, and inquiries are pending for approximately 50,000 tons more. There has also been an improvement in the plate situation, new business and specifications having greatly increased. Iron and steel bars are sluggish, and prices are being guaranteed against declines. Bar iron reached a lower level during the week, a sale of 1,000 tons having been made by a local producer at 1.47½c base, half extras, Chicago. This quotation does not represent the market, however, it being part of a special proposition on a very desirable order. Bar iron is selling generally at 1.50c Chicago. There is a fair demand for sheets, though prices are weak. Structural steel continues dull, mills reporting no sales of any importance. Merchant pipe, merchant steel and wire products are all moving freely, the manufacturing and jobbing trade buying in round tonnages. On the larger sizes of pipe, the leading producer is sold up for the balance of the year. Billets and wire rods are quiet, and it is significant that the rod mill at Joliet has been shut down for a week or ten days. The Anderson rod mill of the American Steel & Wire Co. has also been idle for some time undergoing repairs. Scrap has fallen off again from 50 cents to $1 a ton, and trading is reduced to a minimum. Coke is in good demand, though shipments are seriously delayed by the car shortage in the Connellsville region.

Pig Iron.—The attitude of buyers in this section is practically unchanged and trading in foundry irons appears to be at its lowest ebb. Some interest has been developed in other grades, a local consumer being in the market for 5,000 tons of basic iron, and other firms for 500 tons, 1,000 tons and 1,500 tons respectively of malleable Bessemer. These are about the only large deals pending, and it is doubtful if any of them will be closed for the present owing to the unsettled state of the market. A sale of 500 tons of 5 percent silvery iron at $12.50, Birmingham, represents what is probably the largest transaction of the week, other business being largely of a carload nature. Prices of Southern irons are gradually getting lower, notwithstanding the action of the associated furnaces in reaffirming the present schedule at its meeting ten days ago. Independent furnaces have been selling No. 2 foundry in the West on the basis of $10.75, Birmingham, in some instances going as low as $10.25; and reports are frequent that one of the parties to the Southern agreement is openly meeting this competition. It is certainly true that those furnaces which are holding out for $11.75 are booking only a small tonnage. Northern furnaces are suffering in proportion with those in the South from the prevailing weakness and have been compelled to meet this competition. Two have blown out rather than continue to make iron on this basis—the Zenith at Duluth, and the stack at Mayville, Wis.—and more will in all probability follow in pursuance of the plan to curtail production. We have revised our prices, the minimum quotations being those made by independent interests, and quote as follows:

Lake Superior charcoal	$18 00 to 18 50
Northern Coke Foundry No. 1	16 50 to 17 00
Northern Coke Foundry No. 2	16 00 to 16 50
Northern Coke Foundry No. 3	15 50 to 16 00
Northern Scotch Foundry No. 1	16 50 to 17 00
Southern Coke No. 1	15 10 to 16 10
Southern Coke No. 2	14 60 to 15 60
Southern Coke No. 3	14 10 to 15 10
Southern Coke No. 4	13 60 to 14 60
Southern No. 1 soft	15 10 to 16 10
Southern No. 2 soft	14 60 to 15 60
Southern Gray Forge	13 60 to 14 35
Southern Silveries (4% to 5% silicon)	18 00 to 18 50
Southern Silveries (5% to 6% silicon)	18 50 to 19 00
Jackson Co. Silveries (6% to 8% silicon)	19 80 to 20 80
Jackson Co. Silveries (8% to 10% silicon)	20 80 to 21 80
Ohio Strong Softeners No. 1	17 50 to 18 00
Ohio Strong Softeners No. 2	17 30 to 17 50
Alabama and Georgia Car Wheel	24 85 to 25 85
Malleable Bessemer	16 50 to 17 00
Basic iron	15 35 to 15 85

Billets.—Little demand has come up in the week, and the total tonnage is of small proportions. Independent producers are reported to be shading prices. We quote mill shipments, carload lots, Chicago delivery, Bessemer billets, $27; open-hearth, $28. Forging billets in small lots, $32. From store, forging billets are quoted, $1.60 to $1.70 per 100 pounds.

Bars.—Demand for bar iron continues to be of about the same proportions as for several weeks past. Orders and

specifications are generally for small lots covering requirements for only a few weeks ahead. Season contracts are usually closed with a guarantee against declines. The principal feature of the week is the sale of 1,000 tons by a local producer at 1.47½c base, half extras, Chicago, the deliveries extending into July next. This deal was of a special nature, and on account of the desirability of the specifications and the inclusion in the contract of several clauses favorable to the seller, the regular price was shaded to the above. Iron is generally held at 1.50c, Chicago. Specifications for steel are coming in with a little more freedom and new business is also of fair proportions. Contracting for season requirements is considerably lessened, however, owing to the wide diffeernce in the value of the two products. We quote mill shipments, carload lots, Chicago delivery, iron, 1.50c to 1.55c; Bessemer steel, 1.76½c; angles, less than 3x3, 1.86½c base; hoops in lots of 250 tons and greater, 2.06½c; less than this amount, 2.16½c. Quotations from warehouse stocks, iron, 1.75c to 1.85c; steel, 1.90c to 2c; hoops, 2.30c to 2.40c; angles, 2.10c rates.

Sheets.—An increased demand is noted for black sheets, all gauges sharing in the buying movement. The active competition which independent mills are waging against one another and the leading producer against them all is keeping prices at a low range. We quote black sheets, mill shipments, Chicago delivery, No. 27 2.61½c to 2.71½c; No. 28, 2.71½c to 2.81½c. Galvanized is quiet, prices ranging from 75, 10 and 2½ percent to 75, 10 and 5 percent discount, mill shipments. On lots from store, we quote No. 27, black, 2.76½c to 2.86½c; No. 28, 2.86½c to 2.96½c; galvanized, 75 percent to 75 and 5 percent.

Plates.—The market has shown a marked improvement during the week, new business and specifications on old contracts being of much larger volume. Prices are firm without change. We quote mill shipments, Chicago delivery: Tank steel, ¼ inch and heavier, 1.75c; flange steel, 1.85c. On lots from jobbers' stocks, we quote: Tank steel, ¼ inch and heavier, 2c to 2.10c; 3-16, 2.10c to 2.15c; No. 8, 2.15c to 2.20c; No. 10, 2.30c to 2.35c; flange steel, 2.25c to 2.40c, all f. o. b. warehouse.

Structural Material.—There is little news, trading during the week being limited to small lots. Specifications have also been small. We quote mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.75c; 18 inches and over, 1.85c; universal plates, 1.75c; angles 3x3 and larger, 1.75c; tees, 3x3 and larger, 1.80c; zees, 1.75c. Lots from store, for which there has been a moderate demand, are quoted 2.10c to 2.25c per 100 pounds, rates, cut to length.

Merchant Steel.—Buying continues to be of fair volume, and while no contracts have been closed large enough to be worthy of special comment, the total tonnage is of good proportions and indicates no decrease in consumption. We quote mill shipments, Chicago delivery, as follows: Spring steel, 2.65c to 2.75c; sleigh shoe, 1.95c; flat sizes, concave and convex, 2.25c; cutter shoe, 2.50c to 2.60c; machinery steel, 2.15c to 2.25c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.35c to 2.45c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; special, 13c and upwards; less than carload lots, 5 and 10 percent higher; cold rolled shafting, carload lots, 47 percent off; less than carload lots, 42 percent off.

Merchant Pipe.—Mills report that there is no decline in the volume of business and that all branches of the consuming trade are specifying freely. On the larger sizes of pipe, the leading interest has sold its capacity to the end of the year. Prices are without change, mill deliveries, carload lots, random lengths, f. o. b. Chicago, being as follows:

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ⅜ inch inclusive.....	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¼ to 6 inches.....	73.35	63.35	70.35	60.35
7 to 12 inches inclusive.....	67.35	57.35	64.35	54.35

Less than carload lots, 12½ percent advance over above prices.

Boiler Tubes.—There is no diminution to be noted in the demand which has continued heavy for some time past. All sizes of tubes are moving freely and mills are well sold ahead. Prices are firm, mill shipments carload lots, Chicago delivery, being as follows:

	L. W. Steel. Percent.	C. C. Iron. Percent.
1 to 1½ in.	40	35
1¾ to 2½ in.	55.85	35.85
2¾ to 5 in.	60.85	45.85
6 to 12 in.	55.85	35.85

For lots direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron. Percent.
1 to 1½ in.	40	35
1¾ to 2½ in.	50	32½
2¾ to 5 in.	57½	42½
6 to 12 in.	50	32½

Cast Iron Pipe.—Buying is limited very largely to small orders, though these in the aggregate form a good tonnage. We quote carload lots, f. o. b. Chicago, 4-inch pipe, $30; 6-inch and upwards, $29; gas pipe, $1 a ton higher.

Rails and Track Supplies.—The principal business of the week was a round lot taken by the Illinois Steel Co. Several other contracts were closed, but these were for lots ranging from 2,000 to 500 tons. Inquiries pending, however, aggregate 50,000 tons, of which a large proportion is expected to be closed this week. Light rails and track supplies are in good demand. We quote standard sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than car lots, $32; second quality rails, $27; 25-pound rails, $31 to $32; 12-pound rails, $34 to $35, with regular differentials for intermediate sizes. Track supplies, mill shipments: Angle bars, 1.90c to 2c; spikes, first quality, 2c to 2.10c; (out of store, 2.25c to 2.35c rates, carload lots) second quality, 1.80c to 1.90c; track bolts 3½x¾, with square nuts, 2.75c to 2.85c per 100 pounds; with hexagon nuts, 2.90c to 3c, with usual differentials for other sizes.

Wire and Wire Nails.—The manufacturing trade is buying actively of smooth and galvanized wire, and hardware jobbers are also sending in heavy specifications for nails, fencing, barb wire, etc. The closing down of the rod mills at Joliet and Anderson, from which plants the American Steel & Wire Co. draws the bulk of its supply of rods for its Western mills, is apt to curtail production and delay shipments. However, it is reported that the repairs at both mills, for which they were ostensibly closed, are being rushed forward at a rapid rate and that both plants are expected to be running again shortly. We quote prices to jobbers, Chicago delivery. Wire nails, carload lots, $2.20; less than carload lots, $2.30. Cut nails, steel, carload lots, $2.26½; less than calroad lots, $236½. Plain wire, $2.10 carloads and $2.20 in small lots; galvanized, carloads, $2.40; smaller lots, $2.50. Barbed wire, carloads, $2.50; less than carloads, $2.60; galvanized, carloads, $2.80; less than carloads, $2.90; staples, carloads, $2.30; smaller lots, $2.40; galvanized, carloads, $2.60; small lots, $2.70. Bale ties, 82½ and 5 percent discount f. o. b. Waukegan on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Coke.—Car shortage at Connellsville which has seriously delayed shipments to consumers in this section, has created an active demand for spot fuel, for which premiums of 25 cents to 50 cents above regular prices are being paid. Melters are contracting for future requirements freely and the market is healthy and brisk. We quote standard 72-hour Connellsville, $2.75 to $3.25 at the ovens; 48-hour Connellsville, $2.15 at the ovens. Virginia and West Virginia grades, $5.15 to $5.40, Chicago.

Old Material.—Mills have bought very little material during the week on account of the high prices being asked by dealers. Most of them have good sized stocks in their yards or contracted for and are not anxious to buy while conditions in the finished market are so doubtful, and the probabilities are there will be no improvement until the price of pig iron has been settled on a firm basis. One prominent dealer in old material stated there was no market on scrap, each transaction being governed entirely on its own merits. The following quotations are only nominal, some mills stating that they can shade them

from 50 cents to $1 a ton. We quote dealers' selling prices, gross tons, as follows:

Old iron rails	$16 00 to 16 50
Old steel rails (mixed lengths)	13 00 to 13 50
Old steel rails (long lengths)	15 50 to 16 00
Relaying rails	21 00 to 22 00
Old wheels	16 50 to 17 00
Heavy melting steel	12 50 to 13 00
Mixed country steel	10 50 to 11 00

The following are selling prices for net tons:

No. 1 R. R. wrought	$14 00 to 14 50
No. 2 R. R. wrought	12 50 to 13 00
Shafting	14 50 to 15 00
Dealers' forge, No. 1	12 00 to 12 50
No. 1 busheling and wrought pipe	10 50 to 11 00
No. 1 cast	13 00 to 13 50
Heavy cast (300 pounds and over)	10 00 to 10 50
Agricultural malleable	12 00 to 12 50
Iron axles	17 00 to 17 50
Steel axles	14 50 to 15 00
No. 1 boilers, cut	11 00 to 11 50
Cast borings	5 00 to 5 50
Mixed borings, etc.	5 00 to 5 50
Wrought turnings	10 00 to 10 50
Machine shop turnings	10 00 to 10 50
Iron axle turnings	10 75 to 11 25
Steel axle turnings	10 00 to 10 50
Stove plate and light cast scrap	10 00 to 10 50
Old iron splice bars	14 25 to 15 00

A. M. Crane & Co., Inc., Chicago, announce the resignation of A. M. Crane as president and director of the company, his interest having been purchased by C. R. Robinson and B. M. Gardner. Mr. Gardner has been elected president of the company and will also serve as treasurer as heretofore. The change in officers will cause no change in the business, which will be conducted as previously, or in the financial standing of the company, as no capital has been withdrawn. The company has done a very large business as brokers and merchants of iron and steel, dealing extensively in billets, rails, bars, sheets, structural shapes, and miscellaneous products.

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Oct. 13.

The present outlook is that the movement of ore will be practically completed early in November, as shipments by that time will be ample to meet all requirements. Arrivals of vessels have been much delayed for several days on account of a wreck in the St. Clair flats canal, which has made navigation very dangerous. Vessels are finding it difficult to get cargoes, but no effort has been made by shippers to establish lower freight rates.

Pig Iron.—It is announced that the rate of $10.75 for No. 2 foundry, Birmingham, made by the agency of a company which is a member of the Southern Association, has been repudiated by the company as unauthorized, but independent interests are selling on the $10.75 basis, which is equivalent to $14.60, Cleveland, under the new freight rate of $3.85 from Birmingham. Numerous small orders have been taken at that quotation, but the association furnaces, which adhere to $11.75 as the basis, are doing no business. Northern is a shade lower and is selling at $15 to $15.25, Cleveland, for No. 2. The curtailment of product in this district will be done in some cases by banking or blowing out for from 20 to 30 days, while other furnaces will reduce their daily product 25 percent. This is being done by the Cleveland Furnace Co., which is now making 275 tons of foundry iron daily, although it could make nearly 400 tons. We quote as follows for Cleveland delivery, save on gray forge, which is at Valley furnace:

Bessemer	$16 00 to 16 25
No. 1 Strong Foundry	15 50 to 16 00
No. 2 Strong Foundry	15 00 to 15 25
No. 3 Foundry	14 75 to 15 00
Scotch No. 1	15 75 to 16 00
Scotch No. 2	15 00 to 15 50
Gray Forge, Valley furnace	13 50 to 13 75
Lake Superior charcoal	18 00 to 18 50

Finished Material.—The market has been extremely dull. With the exception of the new Rockefeller building, for which the contract has not been let, there is no heavy business in structural material in sight. Building is almost at a standstill, owing partly to high cost of labor and some materials other than iron and steel and partly to the condition of the money market. Bar iron is extremely quiet. One mill in Cleveland shut down for a week on account of having no orders and there is general complaint of lack of business, even at present quotations, which are 1.40c to 1.45c at the mill. Steel is still quoted at 1.60c for Bessemer and 1.70c for open-hearth, Pittsburg. Few orders are being taken, but specifications on contracts are coming in satisfactorily. Out of stock iron and steel are both selling at 1.80c to 1.85c. Business in sheets is more satisfactory than in some other lines, but the volume is small and the independent producer with his low prices is still in evidence. On sales made through jobbers, the prices of the principal producer are unchanged as follows: Galvanized sheets, mill sales, carload lots, Nos. 10 and 11, 2.60c; Nos. 12 to 14, 2.70c; Nos. 18 to 21, 3c; Nos. 22 to 24, 3.20c; Nos. 25 and 26, 3.55c; No. 27, 3.80c; No. 28, 4.05c; No. 29, 4.45c; No. 30, 4.95c. Galvanized sheets out of stock are quoted 75 and 5 off. For 3-16-inch black sheets and heavier we quote 2.15c, Cleveland. Mill sales of black sheets to consumers are made on the following basis: No. 24, 2.65 to 2.75c; No. 26, 2.75c to 2.85c; No. 27, 2.85c to 2.95c. The following are the prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.50c to 2.60c; No. 16, 2.60c to 2.70c; Nos. 18-20, 2.75c to 2.85c; Nos. 22-24, 2.85c to 2.95c; Nos. 25-26, 2.95c to 3.05c; No. 27, 3.05c to 3.15c; No. 28, 3.153 to 3.25c.

Old Material.—The only kind of scrap for which there is any demand is stove plate, which is rather scarce. Mill scrap is lower. We quote the following, gross tons, Cleveland.

Old iron rails	$18 00 to 19 00
Old steel rails (over 6 feet)	16 00 to 17 00
Old steel rails (6 feet and under)	15 00 to 16 00
Old car wheels	17 00 to 18 00
Steel boiler plates	12 00 to 13 00
Malleable iron (railroad)	14 00 to 14 25
Malleable iron (agricultural)	12 00 to 13 00
Heavy steel	13 00 to 13 50

We quote the following net tons:

No. 1 R. R. wrought	$14 00 to 15 00
Mill scrap	13.00 to 13.50
No. 1 machine cast scrap	12 00 to 12 50
Iron axles	19 00 to 20 00
Axle turnings	12 00 to 13 00
Wrought turnings (free from cast)	10 00 to 10 50
Uncut wrought iron boilers	9 00 to 10 00
Grate bars	10 00 to 11 00
Pipes and flues (clean)	12 00 to 13 00
Tank iron	12 00 to 13 00
Hoop and band iron	9 00 to 10 00
Sheet iron	7 00 to 8 00
Wrought drillings	10 00 to 10 50
Stove plate	9 50 to 10 50
Steel axles	20 00 to 21 00
Cast borings	6 00 to 7 00

CINCINNATI.

Oct. 13.

General conditions in the iron trade have continued quiet the past week. The disposition in all lines is to defer placing orders and await developments. Foundry business is dull. A number of local shops are only running two or three heats a week. The tone of the market in the finished lines is quiet and easy. Coke is in fair demand, with foundry coke selling at $2.75 to $3 f. o. b. ovens.

Pig Iron.—The developments of the week have been the general notice to the trade by the association furnace agents of the $11.75 schedule without producing any business. Independent furnaces are quoting on the basis of $10.75 to $11 without much better results. The freight rates from the Virginia furnaces will be reduced 50 cents per ton to Northern points, effective Oct. 15, to equalize the reduction made by the lines from the Alabama district. There is considerable talk in the trade that one of the association furnaces is quoting on the $10.75 basis but proofs are lacking. There is but little demand and the market for Southern iron is dull. The reports of curtailment of production have had no apparent effect on the buyer and there is no improvement in inquiry. These conditions indicate an unsatisfactory situation to both buyers and sellers. There is not much talk as to what the future will bring out, but the curtailment of production is looked to for some betterment in the next two months. The following are the prices current, f. o. b. Cincinnati:

Southern Foundry No. 1	$14 00 to 14 25
Southern Foundry No. 2	13 50 to 13 75
Southern Foundry No. 3	13 00 to 13 25

Southern Foundry No. 4	12 75 to 13 25
Southern Foundry No. 1 soft	14 00 to 14 25
Southern Foundry No. 2 soft	13 50 to 13 75
Gray forge	12 25 to 12 75
Northern Foundry No. 1	16 40 to 16 65
Northern Foundry No. 2	15 90 to 16 15
Northern Silvery (8% silicon)	18 65 to 19 15
Southern car wheel iron	20 75 to 21 75

Finished Material.—The demand is light and the market is quiet and easy in tone. There is no quotable change in prices but concessions are not difficult to obtain. The bar iron market is perhaps the most unsettled and prices are difficult to locate. On carload lots quotations around 1.50c f. o. b. Cincinnati, are made. Steel bars remain at 1.73c base, half extras, with the retail price 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 percent off. We quote black sheets No. 27 at 2.78c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 3.05c; No. 27, 2.95c; No. 16, 2.55c; No. 14, 2.45c; No. 12, 2.40c; No. 10, 2.30c. Tank plates are firm and sell out of store at 2.05c for ¼-inch and 2.15c for 3-16-inch. Beams and channels are quoted at 2c from stock, and angles at 2c for base sizes. In merchant pipe the market remains unchanged. There is still a good demand for the large sizes and deliveries are difficult to obtain, but the smaller sizes are more easily available. Prices hold steady.

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed. Wrought Iron Pipe. Black. Percent.	Guaranteed. Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	63.7	53.7
½ inch	68.7	58.7	65.7	55.7
¾ to 6 inch, inclusive	73.7	63.7	70.7	60.7
7 to 12-inch, inclusive	67.7	57.7	64.7	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	35.2
1¾ to 2½ inch	54.2	34.2
2¾ to 5 inch	59.7	44.2
6 to 13 inch	54.2	34.2

Old Material.—The market is dull and quotations are largely nominal. We quote:

Old No. 1 railroad wrought, net tons	$14 00 to 15 00
Cast machine and foundry, net tons	12 00 to 12 50
Old iron rails, gross tons	18 50 to 19 50
Old steel rails, gross tons	17 00 to 18 00
Old short lengths, gross tons	14 50 to 15 50
Old iron axles, net tons	20 00 to 21 00
Stove plate, net tons	9 00 to 9 50
Wrought turnings, net tons	11 00 to 11 50
Cast borings, net tons	6 00 to 6 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., Oct. 13.

Pig Iron.—The market here during the past week was practically a repetition of the week prior. Sales agents report buying to be in small lots, but of such a steady character as to make a good tonnage. There is, if anything, increased evidence of the determination of buyers to continue meeting their requirements on the hand-to-mouth plan, and nobody here expects anything different at least for this year. Inquiries are on the increase, but they are taken as more of an indication that buyers' stocks are nearly exhausted, than that they believe that anything in the present situation makes it desirable for them to put in their supplies. The somewhat panicky feeling existing several weeks ago is gradually disappearing, owing to the belief that the concerted restriction of the output forestalls any further accumulation of stocks, and that the worst phases of the monetary and industrial securities situation have been passed. Northern irons continue to be marked by irregular prices, but our quotations form the basis of sales made by those who handle standard brands. Some furnaces heretofore making foundry pig, are said to have changed to low-phosphorus and basic. In Southern irons there is nothing of special interest, except that some sales are reported as low as $10.50 at furnace for No. 2 foundry, which is 25 to 50 cents per ton lower than is generally asked here. New York prices are as follows: Northern No. 1 X foundry, $16.75 to $17.25; No. 2 X, $16 to $16.50; No. 2 plain, $15.50 to $16; Southern No. 1 foundry, $15 to $15.50; No. 2 foundry, $14.50 to $15; No. 3 foundry, $14 to $14.50; No. 4 foundry, $13.50 to $14.

Finished Iron and Steel.—The finished material market in general is quiet. In structural material there seems to be considerable business in sight, but it does not crystallize into orders. Southern railroads are expected in the market with some good propositions in the near future. The American Bridge Co. has practically closed a contract for 8,000 tons, in addition to the 20,000 tons mentioned in our last report. The city authorities have not made any definite announcement of what they intend doing with the Blackwell Island contract. Bar iron continue to be a very valuable feature, and 1.45c is said to have been reached. Steel bars remain firm. Sheets are dull, with the buyer in a position to have his figures accepted. There is only moderate activity at best in plates, with plenty of scurrying for orders. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.79c to 1.86c; flange, 1.90c to 2c; firebox, 2.10c to 2.20c; refined iron bars, 1.45c to 1.50c; soft steel bars, 1.70c to 1.75c; steel sheets, in carloads, New York, No. 28, 2.90c to 3c; galvanized, 75 and 75 and 2½ off.

PHILADELPHIA.

Oct. 13.

The policy of curtailing output of pig iron has caused a more hopeful feeling, but there is no advance in prices and the volume of business has not increased. The demand for finished material is very disappointing. The falling off in consumption of iron and steel as compared with last year is estimated at 15 to 20 percent.

Pig Iron.—There is a more settled feeling and if the program of curtailment is carried out, it is believed prices will be firmer. Costs have been reduced considerably. There are not many new orders, but the stock in consumers' yards has been much reduced and there few old contracts unfilled. It is now believed that prices will not be lower. We quote: No. 1 foundry, $16.50 to $17; No. 2 X foundry, $15.25 to $16; No. 2 plain, $14.50 to $15; standard gray forge, $14.50 to $14.75; ordinary, $14 to $14.25; basic, $14.50 to $14.75.

Steel.—The market is in bad condition. Small lots are taken at about $27, but large purchases could be made at considerably lower figures.

Finished Material.—Business is very dull and prospects are not favorable. Prices are maintained by agreement except in bar iron and sheets. We quote: Best refined bar iron, 1.50c to 1.55c; tank plates, steel, 1.75c to 1.80c; angles, 1.75c to 2c; beams, channels for 15-inch and over, 1.75c to 1.90c.

Old Material.—There is no improvement and prices are extremely weak. We quote: Old steel rails, $14.25 to $14.50, miscellaneous heavy steel, $14 to $14.25; low phosphorus scrap, $21 to $23; old steel axles, $16 to $16.50; old iron axles, $18 to $19; old iron rails, $17 to $18; old car wheels, $16 to $17; choice R. R. No. 1 wrought, $16.50 to $17.50; country scrap, $14 to $15; machinery cast, $14 to $15; No. 2 light scrap (forge), $13.50 to $14; No. 2 light scrap (ordinary) $10 to $11; wrought turnings, $10.75 to $11.25; wrought turnings choice heavy, $12 to $12.50; cast borings, $7 to $7.75; stove plate, $11 to $11.50.

BIRMINGHAM, ALA.

Oct. 13.

Notwithstanding the reduction in freight rates, it is generally understood that what are termed the associated furnaces of this district are making very few sales at prices which it is understood were reaffirmed at the meeting held here early in the month. It was given out then that $11.75 was the minimum figure for No. 2 foundry to all points, with the exception of certain points in the East, where a concession of $1 prevailed. Independent furnaces have all along shaded asssociation prices sufficiently to take business when there was any offering, and there are indications at this time that if the Western buyer is to be asked to pay on the $11.75 basis, some members

of the association will feel inclined to either make an open market or probably withdraw. It is difficult to ascertain just the true situation as to prices, figures ranging from $10.50 up for No. 2 foundry, f. o. b. cars Birmingham.

The coal demand is not so active as it was a year ago, though practically all mines in the district are running pretty well to capacity. Effective Oct. 1 there is a reduction of 5 cents per ton in the price of cutting coal, with a corresponding reduction to all day labor at all the mines of the district except those of the Sloss-Sheffield Steel & Iron Co., where a reduction of 2½ cents per ton will be made. The price for mining is based on the price of pig iron, and has heretofore been 57½ cents per ton under the terms of award of the recent arbitration commission, this being the maximum price fixed for mining, based on iron selling at $11.50 per ton and higher at the furnaces, net for all sales for the previous month, with a decline of 2½ cents per ton for each decline of $1 per ton in the selling price of iron. An examination of the books of the Tennessee company for the month of September showed their sales to have netted between $9.50 and $10.50 f. o. b. Birmingham, causing a reduction of 5 cents per ton in the scale of mining at all mines except those of the Sloss-Sheffield company, the latter company having a contract based on the prices of its own iron, whereas the sales of the Tennessee company govern in the contracts at all other mines. The examination of the sales of the Sloss-Sheffield company showed that their September sales netted between $10.50 and $11.50, resulting in a decrease of only 2½ cents per ton at their mines. This difference is accounted for by the larger percentage of low grades sold by the first-named company as compared with the other. The 5 cents reduction in mining causes a reduction of 10 percent in all day wages, as all labor at the mines now works on a sliding scale. The two weeks' pay-day granted the miners by the Arbitration Commission takes effect this month, the miners to be paid Oct. 15 for all September earnings and on Nov. 1 for the two first weeks in October.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, No. 150 NASSAU ST., Oct. 13.

Pig Tin.—Within the week prices have declined nearly 100 points, due chiefly to heavy arrivals. Consumption is only on a moderate scale, and the outlook not regarded as promising, as the quotations for futures here indicate. In London the market during the week has been of a fluctuating character, with a downward tendency. Closing prices today at the Metal Exchange were as follows: Spot, 25.60c to 25.87½c; Oct. 25.25c to 25.50c; Nov. 24.70c to 25c. London's closings today follow: Spot, £114; futures, £114 12s 6d. Arrivals at Atlantic ports for the month to date aggregate 1,425 tons, with 2,215 tons afloat.

Copper.—Dullness of the most pronounced kind prevails. Consumption in building and electrical lines is at a very low ebb, with the situation better in brass foundries. Prices in the open market are nearer the "official" scale than in several weeks past. In London the market has been weak, with adverse factors making the prices of both spot and futures at this writing identical. Closing prices on the Metal Exchange today were nominally as follows: Lake, 13¼c; electrolytic, 13⅛c; casting, 12¾c. London closed today with £53 12s 6d for spot and futures. Exports for the month to date amount to 3,573, against 4,952 tons for the same period last year.

Lead.—Is unchanged at 4.50c for spot. St. Louis is slightly weaker at 4.30c. London is a little lower at £11.

Spelter.—Spot is still selling at 6.00c. Futures are weak at 5.70c for Oct., and 5.62½c for Nov. St. Louis unchanged at 5.60c. London slightly lower at £20 5s.

Antimony.—Cookson's is 7¼c, Hallett's 6¼c, and outside brands 5¾c to 6c.

Quicksilver.—Is quoted at $47 per flask of 76½ pounds in lots of 100 flasks. London is £8 7s 6d.

Nickel.—Is selling at 40c to 47c for large lots down to a ton, and 50c and 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, Oct. 13.

The metal market has been dull and depressed during the week. Buyers continue to purchase in small lots, waiting for lower prices before covering for their season's requirements. Though prices fluctuate from day to day, they keep substantially the same level. We quote: Lake copper, carload lots, 13⅛c to 13⅜c; casting, 13c to 13⅛c. Pig tin, carloads, 26¼c, lesser lots, 26¾c. Pig lead, 4.40c in 50 to 100-ton lots, and 4½c to 4¾c in small quantities. Spelter, 5.70c in carload lots, and 6c in small quantities; sheet zinc, 6¼c; antimony, 7½c to 8c, for both Cookson's and Hallett's.

Obituary.

Ralph H. Harman, president of the Cleveland City Forge & Iron Co., Cleveland, died at his home in New York City, Oct. 13, aged 83 years. Mr. Harman was born in Pulaski, N. Y., and went to Cleveland when 19 years old. He was engaged for a number of years in lake shipping business, and in 1864 was one of the organizers of the firm of Coe, Ely & Harman, which later became the Cleveland City Forge & Iron Co., of which he was president for 39 years. He retired from active business when only 34 years old, but retained a deep interest in the company of which he was president and of which his son, R. A. Harman, is assistant manager. Mr. Harman had lived in New York for 30 years.

William G. Hibbard, president of Hibbard, Spencer, Bartlett & Co., Chicago, wholesale hardware jobbers, died Sunday at his home from an attack of pneumonia. Deceased was 78 years old and was born at Dryden, N. Y. He went to Chicago in 1849 when he was 24 years old, finding employment on the day of his arrival in the hardware store of Blair & Stimson. Six years later he formed a partnership with Fred and Nelson Tuttle and George M. Gray, the firm being known as Tuttle, Hibbard & Co. In 1857 the firm's stock was burned out and in 1865 the Tuttles and Gray dropped out by the sale of their interests, which were purchased by Mr. Hibbard and F. F. Spencer, the new firm taking the name of Hibbard & Spencer. Later A. C. Bartlett and other employes were taken into the business and the co-partnership became a corporation, owning one of the largest wholesale hardware houses in the world.

Consolidated Lake Superior Co. Complications.

The property of the Consolidated Lake Superior Co. has not yet been sold, nor has any definite plan of action been agreed upon. The directors of the subsidiary companies of the Consolidated Co. held a conference in Philadelphia Oct. 8 at which the present situation was thoroughly discussed. A resolution was adopted authorizing Speyer & Co., of New York, to take possession of the various plants of the company at the Soo, mortgaged to the Central Trust Co., of New York, trustee, under the mortgage dated Jan. 1, 1903, which secured the Speyer loan of $5,050,000, provided that Speyer & Co. grant an extension of time for the sale of the collaterals of the company, which they hold, 60 days beyond Oct. 15.

At Toronto, Oct. 12, a temporary injunction was granted the Consolidated Lake Superior Co. to prevent further proceedings by Speyer & Co.

Chas. H. Wilken, of Mt. Vernon, who for the past six years has been identified with the hardware trade as export salesman, with Sargent & Co., of New York, has secured through Hapgoods, 309 Broadway, New York, a position with Patterson, Harral & Gray, of New York.

At a meeting of the subscribers to the "new industry fund" in Anniston, Ala., it was determined to use the fund, which is to be increased to $10,000, in establishing a spike mill and a cooperage plant, to be run in connection with and under the management of the Weller Rolling Mill Co. The committee in charge consists of W. W. Stringfellow, H. W. Sexton and H. B. Rudisill.

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THE "TRUSTS" AND PRESENT CONDITIONS.

However serious may have been the reasons at the bottom of the popular cry for the Government's taking a hand in the "trust" question, recent history lays bare a danger more important because more widespread. It appears that the new Department of Commerce and Labor, which came into existence July 1, last as the result of the act of February 14, proposes through its Bureau of Corporations to aim at two things: (1) protection of the small citizen stockholder; (2) protection of business interests, whether competitors of, sellers to, or buyers from the "trusts." What appeared to be a perfectly rational approach to the subject was framed by President Roosevelt in his Cincinnati speech, when he indicated that the supervision and control of the corporations should first be given to the Government, to be followed by "a system giving to the Government the full knowledge which is the essential for satisfactory action."

The situation today is that there is acute suffering under both the heads which define the mission of the Bureau of Corporations. Not the small citizen stockholder of the United States Steel Corporation alone has suffered, but large stockholders as well. Business interests, whether competitors of, sellers to or buyers from the steel corporation are alike suffering. It is idle to say, as is so regularly said when the stock market has had a decline, that the losses were distributed between paper losses and gambling losses. The classes affected to-day are so large and have such ramifications that they may well be designated "the public. Yet the business interests which are suffering acutely from cancellation of orders, deferring of specifications and falling markets cannot lay these things to the charge of the great corporation whose securities have been so conspicuously affected. Certainly the work of the United States Steel Corporation's operating and selling organizations has shown high ability and foresight. The unwisdom of its dividend policy and its bond conversion scheme (the one the result of the other) has been sharply accented by events; yet it is to be considered that the decisions on both were made in a very different atmosphere from that of to-day.

What relief, then, has the public, when the disease which has already overtaken it is one not even contemplated as coming under the curative powers of all the remedies which have been proposed? An entirely new subject is presented. It will no longer be denied that the cause is the fall in "securities." Barring the wild one of permitting no securities to exist, no remedy for such a fall has been suggested. The "watering" of stock has been recognized as an evil, but legislators have gone on the theory that the buyer must have a care. Sometimes it is worth while, in seeking a general remedy, to look for the causes in an individual case. Two clear cut causes for the present malady present themselves. One is that securities have been bought too freely, by those who could not take care of them. Credit is tied up in them, and when credit becomes tighter the holder must find more credit, or dispose of the securities. As a remedy we have the plea for a "more elastic currency," which is no real remedy at all, since no guaranty could be given that the newly provided elasticity might not find its first employment in facilitating the purchase of securities on narrow margins, thus aggravating the disease it proposed to cure.

Another cause can be more profitably discussed, since it operated not solely through the medium of the stock market, but also directly upon the iron industry. Much important erection work was put off. The direct effect of this on business was not less important because of the cumulative influence it exerted through the stock market, one decline paving the way for a more serious one. The tabling of so many important projects was due to no other single cause so much as to the attitude of labor. The most happy results were expected from the new consolidation regime of steady prices in iron and steel products. But the fact is, all this has been nullified by the inability of investors and contractors to have steady prices for labor. Nothing could be more detrimental to prosperous activity than for a manufacturer to advance the prices of his product simply on the knowledge that that product had been specified in a contract which one of his regular customers had taken. To forestall, not the possibility of such arbitrary action, but a natural legitimate rise in the market, the contractor secures options, and covers immediately on the signing of the contract.

He cannot "cover" on labor; yet in this case he is exposed to the much more serious danger—so general an experience of late—of the price being arbitrarily advanced, purely because he has accepted the contract. Here he is powerless, and no statistician can figure the vast loss which business interests have suffered, through one channel or another, from this one cause. Whatever good effects should result from the steadying power on materials of the capitalized trusts have been largely nullified by the unsteadying effects of the labor trusts.

The industrial combinations and the labor combination have both come in for anathemas from those who have been hurt by the slump of the past year. While no one has had the hardihood to predict the disintegration of the labor unions because of their follies, there have been flings at industrial consolidations as though their fate had been sealed by recent events and disclosures. But overreaching avarice is not a new trait in promoters, nor are the ills that flow from it to be charged against the trusts as essential weaknesses. The reasons that appealed to strong industrial captains as urgent for substituting combination for destructive competition still hold good and as to many of these the experience of the past three years has amounted to a satisfactory demonstration. The mistakes and worse that have attended the wide extension of the consolidation idea are the evils of the probationary period, and are not inherent. These must be eliminated. To-day both the capitalistic trusts and the labor trusts are under the public harrow. The final outcome will depend upon the use that is made of the season of discipline.

LAKE SUPERIOR IRON MINES.

Messrs. T. F. Cole, W. J. Olcott, W. A. McGonagle, F. E. House, R. Augst and others, all mining and railway managers of the United States Steel Corporation, J. L. Greatsinger and others have been on the Mesabi range this week, accompanied by engineers of the Westinghouse and General Electric companies and by hydraulic and electrical engineers of the Great Northern Power Co., of Duluth. They are to inspect iron ore traffic from mines to Duluth and the railway problem connected therewith. This is preliminary to estimates of the cost of converting the entire main lines of both the Duluth, Mesabi & Northern and the Duluth & Iron Range roads from steam to electric motive power. The two roads handle a maximum traffic of about 2,000,000 tons a month and the project is by far the most important that has ever come up in electrical railway development. Preliminary estimates are for the saving of about $500,000 a year by each road, and the plan suggested contemplates the adoption of 1,800-h. p., 1,500-ton alternating current trolley locomotives similar to those supplied the Baltimore & Ohio at its Baltimore terminals by the General Electric Co.

A hoisting plant, consisting of two 28 by 60 Corliss engines with two 12-ft. drums, with automatic safety devices to prevent overwinding, are to installed at Aragon mine, Menominee range, in a few weeks. The plant is similar to that at Savoy-Sibley, Vermillion range, except that the latter is virtually two hoists in one. There are, of course, changes in minor detail, the chief of which is that the clutches are on the ends of the drums instead of in the centers. A plant similar to that for Aragon is nearly ready for Pioneer B shaft, Vermillion range. Both are coming from the shops of the Sullivan Machinery Co., Chicago. A very fine high-pressure air compressor has just been set at Aragon for operating the pneumatic system. The original plant was largely experimental, was not large enough and was not economical in steam. The new compressor has a cross-compound condensing steam end with a four-stage air end with intercoolers and is the latest type of machine. It compresses to 850 pounds, and the locomotives take air at 750 pounds. This machine is running smoothly and well. This is also a Sullivan plant. A first-motion Corliss hoist, with two 8-foot drums with 9-foot face, is under construction for Pascoe shaft of Republic mine, Marquette range. At Norrie a fine hoisting plant capable of lifting 6-ton skips and loads 1,500 feet is to be put in next spring. The Oliver Iron Mining Co. is building a large saw mill at Ironwood and equipping it with single circular, etc., for sawing and fitting its own mining timber for the Gogebic group. At Colby mine the operators will install a new hoisting plant capable of hoisting 5-ton skips 3,000 feet.

At the Hawkins mine of the International Harvester Co., Mesabi range, the small creek that flows by the location broke bounds on account of tremendous rains and flooded the mine. It is not probable that any heavy quantity of ore can be shipped this season. The Hawkins had been shipping about 600 tons a day for the entire summer.

Kanawha mine, 58-16, Mesabi range, has closed for the season with small shipments.

It is not probable that the coking plant and chemical works of the Zenith Furnace Co. of Duluth, will be ready for operation this fall. Slight delays have occurred and the work is, as a whole, taking more time than was originally expected. The furnace may not be running before spring. No coal nor limestone is yet coming up for winter use and the company's mine will be run very light for a time.

The Master Boiler Makers' Association, at its meeting in Chicago, Oct. 11, elected the following officers: President, T. C. Best; vice president, William Wilson; secretary, George M. Clark; treasurer, J. J. Boyce. The next meeting will be held in St. Louis next September.

The plants of the Carnegie Steel Co. at South Sharon Pa., which have been idle since Aug. 1, will be placed in operation about Nov. 1. The blast furnace will also be blown in about this time.

STEEL CORPORATION INSPECTION TOUR.

Officials of the United States Steel Corporation began on Monday, Oct. 12, their annual inspection tour of the properties of the sudsidiary companies. The Homestead and Edgar Thomson plants of the Carnegie Steel Co. were first visited. At Homestead the erection of the new plate mill and the additions that are being made at the armor plate plant attracted much attention, while at Edgar Thomson the ground was looked over for the making of future improvements. The party then left for McKeesport to see the new work that is being done at the plant of the National Tube Co. On Tuesday the new plant of the American Bridge Co. at Ambridge, Pa., was visited and the party then left for the Mahoning and Shenango Valleys. Lorain, O., is next on the list, after which the plants in the West will be visited. The party will return to New York next Tuesday.

It is also probable that some definite action will be taken with regard to the plants acquired by the purchase of the Sharon and Union Steel companies, which have never been placed in operation. At Donora, Pa., the open-hearth plant of the Union Steel Co., which is practically completed, has never been started, while at South Sharon, Pa., a modern sheet mill and tube plant have never turned a wheel. The tube plant will probably never be operated, while the sheet mill machinery may be removed to Vandergrift, Pa. Whether the open-hearth plant at Donora will be operated is a matter of conjecture.

The inspection party consists of the following persons: W. E. Corey, president; James Gayley, first vice president; W. B. Dickson, second vice president; W. J. Filbert, controller; George G. McMurtry, president American Sheet Steel Co.; Daniel Coolidge, president Lorain Steel Co.; Alfred J. Major, president American Bridge Co.; W. P. Palmer, president American Steel & Wire Co.; W. T. Graham, president American Tin Plate Co.; E. J. Buffington, president Illinois Steel Co.; Alva C. Dinkey, president Carnegie Steel Co.; W. B. Schiller, president National Tube Co.; H. C. Frick, George W. Perkins, Robert Bacon, Elbert H. Gary, W. R. Walker, D. M. Clemson, D. G. Kerr, William Edenborn, Thomas Lynch, H. J. Lindsay and James H. Reed.

It is understood that the inspection will be thorough and will be made, in part at least, with a view of reducing operating expenses. It is also announced that the corporation, acting in harmony with other interests, will ask the railroads to make a reduction of freight rates.

Large Machine Tool Order.

The Niles-Bement-Pond Co., has taken the contract for most of the machine tools for the new shops of the Candian Pacific Railroad. The amount is about $160,000. It is said that the orders for the remainder were given to the John Bertram & Sons Co., Ltd., Dundas, Ont., and other Canadian houses.

Locomotive Works Not Slackening.

The Baldwin Locomotive Works took orders in September for 232 locomotives, all large ones, and they built 201. Their sales for September amounted to $3,300,000 and the company is proceeding at the same gait for October with enough work ahead to keep going for the first six months of next year.

The American Locomotive Works took orders for 44 engines last week and have on the books orders for 1,200 engines.

The Diamond Drill & Machine Co., Birdsboro, Pa., has opened an office in Pittsburg, in the Farmers' Bank Building, in charge of G. B. Nutt, the Pittsburg representative of Pilling & Crane, the latter firm being the Pittsburg agents.

Announcement is made of the removal on Oct. 10 of the general offices of the following companies to 43 Exchange Place, New York: International Nickel Co., Orford Copper Co., Canadian Copper Co., Anglo-American Iron Co., Vermillion Mining Co. of Ontario, American Nickel Works and Société Minière Calédonienne.

The Labor Situation.

DRIVEN TO BANKRUPTCY BY LABOR UNIONS.

Sterling F. Hayward, of New York City, has been appointed receiver of the Morse Iron Works & Dry Dock Co., of Brooklyn. The receiver is a director of the company, and was appointed on application of three creditors, whose combined claims amount to $3,500. Trouble with labor unions is one of the chief causes of the firm's present difficulties. The bonded debt of the company is $625,000. The unsecured claims amount to $500,000. There are about 200 creditors, the largest being Edward P. Morse, president of the concern, with a claim of more than $200,000. About nine months ago the company was able to meet all outstanding obligations, but there was not sufficient working capital, and the creditors agreed to accept notes, the first series of which fell due Oct. 5. A strike was declared in the yards May 6, which crippled the company badly. Instead of employing 3,000 men, as before the strike, the company has since been employing only 300. The liabilities are estimated at about $1,000,000, and the plant is said to be worth twice that amount. Mr Morse built up the business in less than 20 years, having been himself a workman. President Morse said:

"Organized labor has ruined our business; but there are others. Along this and other coasts, wherever ships have been built and repaired, there are the magnificent ruins of great enterprises that have been wrecked by labor unions or their walking delegates. If you think not, go ask Charles Cramp, who only recently resigned the presidency of the company which bears his name and which recently has had to be reorganized. If you think not, go talk with Lewis Nixon or other officers of the United States Shipbuilding Co., and if you think not, go down to Shooter's Island and find out what organized labor has done to clog the wheels and make fireless the forges that have burned and flamed for the profit of the men who own them and for the profit of the men who had labor to sell."

LABOR NOTES.

After holding several conferences with its employes and failing to reach any satisfactory agreement on the proposed reduction of 10 percent in wages, the Louisville Bolt & Iron Works, Louisville, Ky., closed the plant indefinitely. Several hundred men are thrown out of employment. President Bonnie informed the men that the general dullness in the iron trade made it imperative that a reduction in wages be made. He reminded the men that their wages had been twice increased recently, a raise of 5 percent being granted each time, and asked that they go back to the old wages during the dull period, promising that the rate would be restored as soon as business would justify it. The men informed Mr. Bonnie that they would accept no reduction.

Notice has been posted at the Pencoyd Iron Works of the reduction of 20 percent in wages of the employes of the 12-inch rolling mill for those who earn from $4 to $9 per day, while those receiving less than $4 and more than $2 would receive a 10 percent reduction. Unskilled laborers who receive $1.40 a day are not included in the reduction. About 400 men are affected by the order. It was also announced that the 600 or more men recently laid off will be given four days' work each week.

The strike of the men at the Springfield Boiler Mfg. Co.'s plant, Springfield, Ill., which had been on for nearly four months, was declared off last week, and the men returned to work for less money than the company offered shortly after the strike began. The boiler workers will get $2.70 for 9 hours' work. They demanded $2.88.

Operations have been resumed at the plant of the Bates Machine Co., Joliet, Ill., after four months' suspension on account of the strike of machinists. The minimum rate of wages is to be 32 cents.

The Russel Wheel & Foundry Co., Detroit, and the structural iron workers' union are engaged in a controversy over the union scale of wages, and the men have stopped work on several buildings on which the company is doing contract work.

Notices have been placed about the Bethlehem Steel Co.'s works, South Bethlehem, Pa., announcing a reduction of 10 percent in wages to take effect immediately. About 300 men are affected.

The strike of the structural iron workers against Oscar Daniels & Co., contractors on the new Louisville & Nashville shops, South Louisville, has been ended and the men returned to work Oct. 7. The national organizer of the union advised the men to return to work.

At Joliet, Ill., 1,500 men employed in the converter billet mill and rod mills of the Illinois Steel Co. were thrown out of employment Oct. 10 by the closing of those departments. Supt. Sheldon said the shutdown might last only a short time. There is no large accumulation of rods at the Joliet wire mills, which are running as heretofore.

President Buchanan of the International Association of Bridge and Structural Iron Workers says he does not know of any conditions existing in the bridge and structural iron workers' calling, in any part of the United States, which would cause a general strike or even a local strike of any magnitude.

The Patternmakers' Union, of Pittsburg and vicinity, has declared off the strike which has been on for the past 6 months. The men were receiving $3.78 per day of 8 hours and demanded an increase to $4. This was refused and their later proposition of returning to work at the old scale was also turned down recently. The strike was declared off for the reason that the men have no further funds with which to carry on the conflict.

While not officially confirmed, it is reported that the Amalgamated Association of Iron, Steel and Tin Workers made a reduction in the skelp mill scale of the Youngstown Iron Sheet & Tube Co. of about 10 percent on account of the improved machinery and improved methods of operating skelp mills at this plant. The scale has a base of 71½ cents per ton for finishing.

At the meeting of the officers of the building trades national and international organizations, held in Chicago, Oct. 9, the general plan for the creation of what will be known as the Structural Building Trades Alliance of America, was agreed upon. It is expected that organizations having a membership of 1,000,000 men in the building trades will be represented. The platform of principles places strong emphasis on the establishment of local and international boards of arbitration to settle disputes as they arise without resorting to strikes. Another principle is to keep agreements with employers inviolable, and to avoid and discourage strikes and prevent internal strife in the building trades industry.

It was announced in New York Oct. 10, that orders would be issued whereby 15 percent of the employes in the car shops, repair shops and roundhouses of the entire Vanderbilt system will be informed that their services are no longer needed. Thus 1,500 men will be thrown out of employment, making a saving of about $3,000 a day. An official of the New York Central Railroad has been quoted as saying that the action is due to two causes, "first, that the outlook at present demands that retrenchment be made, and second, that the condition of the rolling stock of the company is such that it can be made in the department which has charge of that with the least damage to effectiveness." The orders go into effect Oct. 15.

During the past week the trouble that has been pending at the New Philadelphia, O., plant of the American Sheet Steel Co. on account of the employes affiliated with the Amalgamated Association of Iron, Steel and Tin Workers, exceeding the limit of output has been amicably settled. The company posted a notice in the plant that the limit should no longer be exceeded by the men, and the reinstatement of employes discharged by rollers on account of their refusal to exceed the output limit was demanded. This satisfactorily settles all matters so far as the American Sheet Steel Co. is concerned. At the Stark Rolling Mill Co., Canton, O., a strike was declared on account of

the refusal of the company to limit the output in accordance with the scale. The privilege of exceeding the output was granted this company by President Shaffer earlier in the year, to continue in force until the sheet conference should be held in Pittsburg.

The Erie railroad will, it is announced, reduce the number of its employes, but will not abandon any of its new construction work. The Southern Pacific will reduce its force by 1,200 men and other railroad companies are expected to follow a similar policy.

In a letter to the building trades unions of New York city and vicinity, Samuel Gompers, president of the American Federation of Labor, and James Duncan, secretary, have recommended that the unions agree to the plan of arbitration of the employers' association. This action, which comes after Mr. Gompers' investigation of the labor situation in that city, is considered a defeat for the building trades unions which have refused to sign the plan of arbitration.

PERSONAL.

The inventory of the estate of the late B. F. Jones, of the Jones & Laughlin Steel Co., of Pittsburg, filed last week, shows that he left a personal estate valued at $17,236,663. The inventory shows stock valued at $14,870,615, $1,649,089 in bonds, $349,499.84 in cash, $310,740 in notes, and amount due the estate, $56,719.82.

Richard Fitzgerald, Greenville, Pa., has been appointed to the office of vice president of the Sixth district of the Amalgamated Association of Iron, Steel and Tin Workers. He succeeds George F. Harbin.

Samuel A. Wallace, manager of the Sharon plant of the American Steel Foundries Co., has been appointed manager of the company's plant at Alliance, O. His successor at Sharon has not yet been appointed.

J. L. Mishler, who for the past five years has been in charge of the accounting department of the Kelly Foundry & Machine Co.'s offices, Evansville, Ind., has resigned his position to accept a position in Chicago in charge of the accounting department of White's Class Advertising Co.

I. G. Haswig has resigned his position as foreman of the Belleville Stove Works and accepted a position as general superintendent of the Willard Stove & Range Works, of Belleville, Ill. He will be succeeded in his old place by Jas. Little, of the Thos. White Works, Quincy, Ill.

R. J. Russell, assistant manager sales, of the Wagner Electric Mfg. Co., St. Louis, Mo., will become associated after Oct. 15 with the H. E. Lindsay Electrical Supply Co., of the same city, as business and sales manager.

Two recent changes in the executive board of the Iron Molders' Union are announced. Vice President Geo. Custer has resigned to become foreman of the foundry of F. & L. Kahn & Bros., Hamilton, O., of which David Black, formerly editor of the Iron Molders' Journal, became superintendent some months ago. John Loder, member of the board from Pittsburg, resigned to become the representative of the S. Obermayer Co. in Pittsburg and vicinity.

Joseph A. Holmes, chief of the department of mines and metallurgy of the St. Louis Exposition, has been in Cleveland and other cities in the past week interesting foundrymen in the plan for the actual operation of a model foundry as one of the exhibits in his department.

Charles L. Allen, secretary and general manager of the Norton Emery Wheel Co., Worcester, Mass., was given a welcome home from an extended European trip by the employes of the company Wednesday evening, Oct. 7. The 400 employes gave him a reception at the shops and offices, which had been decorated for the occasion, and there was an entertainment later consisting of music and lantern slide views. The employes presented Mr. Allen with a heavy silver cup, mounted on ebony, with three buckhorn handles decorating its sides. Inscribed upon it was "Presented to Secretary and General Manager Charles Lucius Allen by the employes of the Norton Emery Wheel Co. on his return from Europe Oct. 7, 1903."

Kiutaro Yamasaki and Y. Tsuji arrived a few days ago in New York from Liverpool. They are identified with the steel manufacturing plant recently established at Osaka, Japan, and since April have been traveling in England, France and Germany acquiring information regarding the steel business. The plant is known as the Sumitomo Steel Works, and Mr. Yamasaki is the manager. The company manufactures castings for railroads and shipbuilders. The Japanese visitors state that if they find machinery suitable for their use they will place an order for it. They say that they found nothing in Germany that they could adapt to their business. They will visit Pittsburg, Chicago and other Western cities.

Paul L. Hay, son of the late Maj. Samuel W. Hay, who was selling agent for the Whiting Foundry Equipment Co., of Harvey, Ill., succeeds his father, and will continue the business with offices in the Hamilton Building, Pittsburg. Mr. Hay graduated from the engineering department of the Western University in 1895 with the degree of mechanical engineer, and has spent two years in the drawing room of the Pittsburg Bridge Co. and later with the Carnegie Steel Co. on the designing and construction of the Howard Axle Works at Homestead, Pa. After its completion he was transferred to the office of P. T. Berg at Homestead Steel Works. He has just resigned from the Donora plant of the Carnegie Steel Co., where he had charge of the designing and construction of the 40-inch blooming mill.

H. K. Gilbert has resigned as president of the Railway Appliances Co., Chicago. C. F. Quincy was elected to fill the vacancy. Geo. H. Sargent was elected vice president and Percival Manchester secretary and treasure.

New York Meeting, Iron and Steel Institute.

Reference has been made in these columns to the plans for a meeting in this country in 1904 of the Iron and Steel Institute, whose visit to the United States in 1890 is well remembered. At the Barrow-in-Furness, Eng., meeting of the institute last month the invitation to come to this country was formally extended and was accepted. Secretary Bennett H. Brough, of the Iron and Steel Institute, has sent a circular to the membership under date of Sept. 30, asking those who propose to make the trip to the United States to give notice at once of their intention. The following announcement is made:

"It is proposed that the autumn meeting shall take place in New York on Oct. 24, 25 and 26, 1904. After the meeting there will be an excursion to Philadelphia, Washington, Pittsburg, Cleveland, Niagara Falls, and Buffalo, returning to New York on Nov. 10. During the trip night traveling will be avoided, and every endeavor will be made to obviate fatigue. The two Sundays will be spent at Washington and at Niagara Falls. The approximate cost of the stay in the United States is estimated at £25. For the convenience of members desirous of visiting the St. Louis Exhibition, arrangements will be made for a limited number to leave Pittsburg for St. Louis and Chicago, reaching New York on the evening of Nov. 10. This trip will necessitate three nights being spent in sleeping cars, and the approximate cost will be £35."

A petition in involuntary bankruptcy against the New York Car Wheel Works at Buffalo has been filed in the United States Court, the petitioners being the Rochester Car Wheel Works, Rochester, the Keystone Wheel Co., of Pittsburg, and Timothy J. Murphy, of New Jersey. The claims of the petitioners aggregate $30,000. The liabilities are stated in the petition to be about $800,000, and the assets are estimated at $350,000. An official of the New York Car Wheel Works said: "The amounts of assets and liabilities set forth in the petition are not correct. Furthermore, the petitioners have no claims that would warrant them taking a proceeding."

THE FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, in Philadelphia, on Wednesday, Oct. 7. The president, Thomas Devlin, occupying the chair. The following were present:

Thos. Devlin, Thos. Devlin Mfg. Co.
P. D. Wanner, Reading Foundry Co., Reading Pa.
Geo. C. Davis, Chemist.
Dr. E. E. Brown, E. E. Brown & Co.
H. O. Evans, Thos. Devlin Mfg. Co.
C. R. Brown and A. D. Wallace, E. E. Brown & Co.
A. E. Outerbridge, Jr., Wm. Sellers & Co., Inc.
S. G. Flagg, Jr., S. G. Flagg & Co.
Dr. R. Moldenke, Secretary American Foundrymen's Association, New York.
J. S. Robeson, American Glutrose Co., Camden, N. J.
F. C. Price, E. J. Etting.
W. J. W. Moore, Pilling & Crane.
F. A. J. Fitzgerald, Carborundum Co., Niagara Falls, N. Y.
J. Thompson, J. Thompson & Co.
J. H. Pepper, *The Iron Trade Review*.
T. B. Harkins, T. B. Harkins Foundry Co., Bristol, Pa.
August Williams, Enterprise Mfg. Co.
H. L. Haldeman, Pulaski Iron Co.
C. D. Matthews, Camden Iron Wks., Camden, N. J.
F. T. Wright, U. S. Cast Iron Pipe & Fdy. Co., Burlington, N. J.
C. D. Lovell and W. H. Phinney, Tabor Mfg. Co.
W. E. Marks, J. Thompson & Co.
O. J. Ward, Howe Scale Co.
F. Cooper Pullman, J. Wesley Pullman.
Thos. J. Kelley, Abram Cox Stove Co.
W. H. Hunt, Wm. Adams Foundry Co.
Howard Evans, J. W. Paxson Co.

In the course of routine business the treasurer, Josiah Thompson, reported a balance in the treasury of $2,017 and all bills paid.

The nomination of officers for the ensuing year resulted in the following being chosen for formal election at the next meeting, the list with three exceptions showing the renomination of the present directorate:

President, Thomas Devlin, of the Thomas Devlin Mfg. Co., Philadelphia; vice president, A. E. Outerbridge, Wm. Sellers & Co., Philadelphia; treasurer, Josiah Thompson, J. Thompson & Co., Philadelphia; secretary, Howard Evans, J. W. Paxson Co., Philadelphia; executive committee, Thos. M. Eynon, the Eynon-Evans Mfg. Co., Philadelphia; E. E. Brown, E. E. Brown & Co., Philadelphia; R. C. Oliphant, Trenton Malleable Iron Co., Trenton, N. J.; H. O. Evans, Thos. Devlin Mfg. Co., Philadelphia; and T. B. Harkins, T. B. Harkins & Co., Bristol, Pa.; trustees, Thomas Devlin, Josiah Thompson, and Howard Evans.

The chairman of the committee appointed by the association to confer with committees from other bodies, and the officials having in charge the project embracing the operation of a model foundry at the St. Louis Exposition, reported that several meetings had been held, including a joint meeting with members of other committees, and the matter appeared to be in a position which insured the carrying out of the idea. The members of an advisory committee had already been appointed, and included the names of many gentlemen prominent in the foundry industry. It was practically resolved that the foundry should be operated and planned with a view to making the exhibit thoroughly educational, light, heating, ventilation, and equipment all being considered as of more importance than product. The best methods of molding by machinery, handling material before and during the process of manufacturing product, and the preparation of product for market should also be demonstrated. The question of expense was one still before the committee, and nothing could yet be reported on that head.

In reply to a question as to the scope of the operation and the product, Dr. Moldenke said the committee had under consideration the idea of confining the product to light castings, and castings of an artistic character which could be used and disposed of as souvenirs. It was not intended to give away guarded secrets, or, as had been suggested, to educate foreign foundrymen in American practice, but the idea was to show the American people what foundry work and methods were. It is a known fact that the general public is grossly ignorant of foundry work, although this is one of the great interests of the country. Other members expressed their views in regard to the project, all being strongly in support of it.

In a short discussion on the present and future of the foundry trade, it was brought out that while the demand for iron castings for building purposes was very poor, the trade in machinery and general castings was pretty good. In malleable lines the present demand was not so good as it had been. Many foundries were quite busy, but it would seem on old orders rather than new.

Mr. Halderman said, in answer to a qusetion as to the demand for pig iron, that his concern sold iron exclusively to foundries. There had been, to an extent, a falling off in trade, for which the stock market and labor troubles were responsible, but there was much more business doing than the public was aware of. He could say for his concern that they had no iron on hand, and very few orders ahead, but every day they were getting "hurry" orders. He thought the situation was much better than it was three months ago. At present prices, he said, there are not sufficient furnaces in the country to make the iron consumed, and many are making it at a loss.

A paper by F. A. J. Fitzgerald, of Fitzgerald & Bennie, Niagara Falls, N. Y., was then read. The subject was, "The Manufacture and Uses of Carborundum." The paper will be found elsewhere in this issue. After its reading the meeting adjourned.

Inspection Trip of New England Foundrymen.

The October meeting of the New England Foundrymen's Association, at Boston, Wednesday, Oct. 14, had for its afternoon feature a visit to the new plant of the B. F. Sturtevant Co., at Hyde Park. The paper for the evening was by Arthur Simonson, of Philadelphia, on the "Tropenas Steel Process for Castings." It was announced also that Richmond Viall, of the Brown & Sharpe Mfg. Co., Providence, would present indenture papers for coremakers' apprentices, with a view to getting a uniform practice among foundrymen. The Sturtevant plant comprises a four-story office building, 45x125 feet, a three-story building 80x500 feet, devoted to the manufacture of blowers, heaters and galvanized iron work; a building 80x250 feet of the same height, on the first floor of which all engines will be tested, stored and shipped, while the other floors will be utilized by the electrical department; a general machine shop, 120x500 feet, with 40 feet side galleries, devoted principally to the building of engines; a forge shop 40x100 feet; a two-story building 40x100 feet devoted exclusively to lockers, washing and sanitary facilities for employes; a pattern and storage building 80x150 feet in ground plan; a foundry 170x350 feet; a power house 80x80 feet with detached fire and service pump house. The aggregate floor area of the buildings exceeds 9 acres.

The New England Foundrymen's Association is administered in an energetic and progressive way. Its secretary, F. F. Stockwell, of Cambridgeport, has planned the programs of its monthly meetings up to May of 1904 and these have been printed in an attractive folder.

The bid of the Midvale Steel Co., of Philadelphia, on 16,633 tons of armor plate for the navy, was $6,606,932, and those of the Carnegie and Bethlehem companies were identical, being $6,944,000. The Philadelphia company has no plant and cannot deliver any plate before 20 months, while the other companies will begin delivering in eight months. The Carnegie company already has contracts for 17,000 tons and the Bethlehem company contracts for 12,000, and this would have to be delivered before the works could be started on the contract. It might, therefore, be possible for the Midvale company to build a plant and fill the entire contract quicker than the two established plants could turn it out after filling their present orders. This is a point that the secretary of the navy will have to consider.

AMERICAN SHIPBUILDING CO.

At the annual meeeting of the American Shipbuilding Co. held in Jersey City last week, Robt. L. Ireland, vice president, resigned to become a member of the firm of M. A. Hanna & Co., Cleveland. He will continue to be a member of the board of directors of the company. J. C. Wallace, general manager, was elected to succeed Mr. Ireland, becoming vice president as well as general manager. Robert Logan, a marine architect of Cleveland, was elected assistant general manager. Frank W. Hart was elected a director to succeed W. T. C. Carpenter. Other directors were re-elected.

The annual report of the company for the year ending June 30 last shows a decrease in net earnings of $294,710. Added to this the company paid out the sum of $228,000 in the shape of a dividend to common stockholders this year, which item did not appear in the previous annual report. But $418,527 was charged to depreciation and maintenance and $372,559 to the rebuilding of dry dock and repairs. Last year $200,000 was charged to reserve for maintenance and $150,000 for reserve for Buffalo mortgage, but these do not occur in this year's report. The surplus for the year shows a decrease of $315,502, but the total surplus has been increased by the amount remaining this year.

The detailed report for the fiscal year ended June 30 shows:

	1903.	1902.	Decrease.
Net earnings	$2,212,841	$2,507,551	$294,710
Dividend pfd.	553,000	553,000	.....
Balance	$1,659,841	$1,954,551	$294,710
Deprec. and main	418,527	420,294	1,767
Reserve for main.	.....	200,000	200,000
Rebuild dry dock & repairs	372,559	.....	*372,559
Res. Buffalo mort.	.....	150,000	150,000
Total deduc.	$791,086	$770,294	*$20,792
Surplus	$868,755	$1,184,257	$315,502
Common dividend	228,000	.....	*228,000
Balance	$640,755	$1,184,257	$543,502
Previous surplus	2,926,561	1,742,304	*1,184,257
P. & loss surplus	$3,567,316	$2,926,561	*$640,755

*Increase.

President W. L. Brown, in his report to the stockholders, says: "The fourth fiscal year has closed with favorable and satisfactory results in business. The total of vessels built during the past year was 29, having a carrying capacity of 166,000 net tons. The vessels now under construction number 29, having an estimated carrying capacity of 165,000 net tons. It will be noted that considerable construction was unfinished at the end of the fiscal year. Part of this has been delayed by the conditions that have surrounded all classes of manufacture during the year and part was taken for later delivery. The future prospects of the company look very fair, and a number of negotiations for construction are pending. It is, however, not probable that there will be as much of this construction as for several years past, as a Presidential campaign always checks business somewhat. On the other hand, the prospect for the general business of the company is encouraging and no doubt will bring satisfactory results. Of late much attention is being directed toward the construction of a larger type of vessels, and we look forward to a very considerable increase in business in this direction. It has been the aim and study of the officers to keep in close touch with all of the progress and improvements in lake tonnage and to contribute their part toward its encouragement.

"As outlined in the annual report of last year, material improvements and renewals have been made during the year at a number of plants, and especially so at West Superior, Detroit and Cleveland, in addition to which a number of dry docks have been rebuilt and lengthened, to keep pace with the larger lake tonnage. These expenditures have largely added to the value and efficiency of the plants. The sum of $200,000 has been set aside this year for further improvements of this character when necessary."

ROBINSON-TILTON ANGLE COUPLING.

An angle coupling made by the Robinson-Tilton Co., of Columbus, O., is of pin and hinge construction with a very limited sliding movement. It is of recent design and is illustrated in Fig. 1, which shows a vertical section through the device, and Fig. 2, where the lower portion of the case has been removed.

The driving shaft and crank is designated by A, and B is the driven crank and shaft, the intersection of the axis of these shafts being indicated at C. The driving crank pin D always points to C, thus describing a cone, and this pin is fixed in the wing piece E. The part E is connected

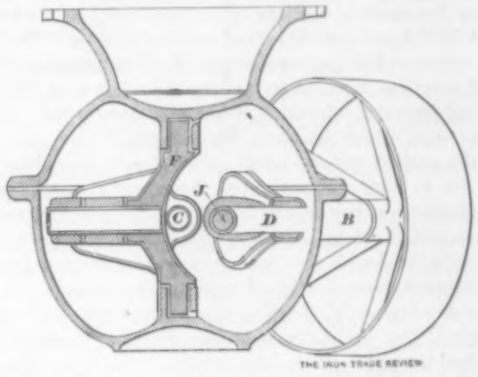


FIG. 1.—VERTICAL SECTION THROUGH ANGLE COUPLING.

to the central oscillating piece F by a hinged bearing at right angles with the crank pin, the axis of the crank pin passing through the center C. The driven shaft is connected to the central piece by a similar link G and a crank pin H.

The central piece is allowed to rotate through 90 degrees on its end bearings, the axis passing through the center C and being perpendicular to the plane of the shaft axes. This motion and the hinged joint between E and F as well as G and H, permits the pieces to follow the motion of the cranks and transmit the movement from driving to driven shaft.

The angle slide piece or link J is introduced to prevent a dead center and to cause the wing pieces to move in

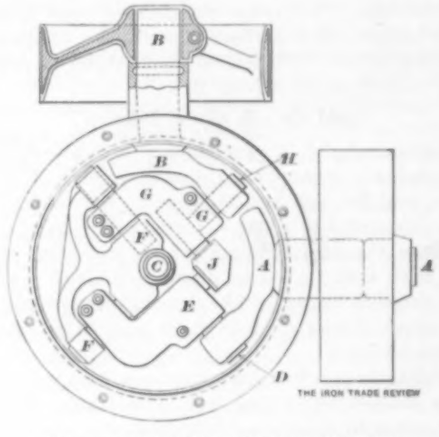


FIG. 2.—LOWER PART OF CASE REMOVED.

harmony. The link J is free to move in holes drilled in the wing pieces and has a slight sliding movement as the wing pieces move on the hinge joint. This slide does not amount to more than ¾ inch in the 25-horsepower coupling.

The illustrations show a right angle coupling but the construction is of course not limited to 90 degree connections and similar devices can be made of the same general design for other angles.

The Buckeye Malleable Iron & Coupler Co., Columbus, O., has declared a quarterly dividend of 2½ percent.

Manufacture and Uses of Carborundum.*

BY F. A. J. FITZGERALD.

In the spring of 1891, Mr. E. G. Acheson, who had been experimenting for some time past on an apparatus for the direct conversion of heat into electricity, without obtaining the success he had hoped for, recalled some old experiments he had made on the production of a very hard substance which might prove of value as an abrasive. He therefore set to work to produce a crystalline form of carbon, and thinking that the fusion of carbon at the high temperature obtained by means of the electric arc might be assisted by mixing with it a more fusible substance, he made a mixture of carbon and clay and put it in an iron bowl which served as his furnace. The bowl was connected to one terminal of a dynamo, while the other terminal was connected to a carbon rod that was plunged into the mixture. When the current was started, an arc was drawn between the bottom of the iron bowl and the carbon rod, and this raised the surrounding mixture to a high temperature. Apparently there was a strong reaction in the mixture, and after the current was cut off and the bowl had cooled its contents were examined with the result that some very hard, sharp crystals of a blue color were found sticking to the carbon rod.

The results of this preliminary experiment were so satisfactory that Acheson now set about making a more practical furnace. This was built of fire brick and had carbon terminals at either end. It was only a few inches long, but nevertheless it was the embryo of the furnace used at the present time. Acheson recognized at once that whatever the crystals he produced might be, they were not diamonds, but some compound containing carbon. He thought that they were probably a compound of carbon and aluminum, and he therefore invented the name "carborundum," a word compounded of "carbon" and "corundum." Hitherto corundum was the hardest substance known with the exception of the diamond and, as is well known, corundum is the crystalline form af alumina, the oxide of aluminum. Now clay is a silicate of aluminum, and it was not long before Acheson found that the more silica there was in the charge mixture the better the yields, and this led him to try the experiment of using a mixture of glass sand, which is a very pure form of silica, and carbon, instead of the clay-carbon mixture. The result was very satisfactory, and eventually analysis showed that carborundum was a compound of carbon and silicon. The actual composition of carborundum is: carbon, 29.70; silicon, 70.30.

Rapid Growth of the Industry.

Having completed his preliminary experiments, Acheson formed a company for the manufacture of the new abrasive, and for the first six months the output of the furnaces amounted to about ¼ pound a day. The crystals taken from the furnace were ground to a fine powder, treated with acid, boiled in water, dried and graded by passing through screens. The screens were made by fastening pieces of wire cloth over the ends of old incandescent lamp sockets.

Naturally the market for carborundum was very limited, the product being absorbed by lapidaries and jewelers. It was sold at so much per carat, the first pound or so put on the market selling at a rate of something like $600 a pound. Improvements, however, were soon made in the manufacturing process, so that carborundum could be sold at the remarkably low rate of $10 a pound, and it then found a new market among valve grinders. The latter were accustomed to use emery for grinding valves, the cost of that material being a few cents a pound, but the enormous saving in labor resulting from the use of carborundum as an abrasive made it well worth while to buy that relatively expensive material.

However, to make a commercial success of carborundum it was necessary to manufacture it on a much larger scale, and this led to the increase of the Monongahela plant until finally furnaces using 120 horsepower were built, and a production of 300 pounds a day reached. It was hoped that with the greatly reduced price of carborundum the emery wheel makers would use it; but this hope proved to be ill-founded. The only thing the Carborundum Co. could do under these circumstances was to go into the manufacture of its own wheels. Accordingly, machinery for this purpose was installed and kilns were built.

It would take altogether too much time to follow in detail the development of the manufacture of carborundum and carborundum products; but eventually it was decided that the work should be carried on in a much larger way, and the Carborundum Co. started its plant at Niagara Falls, in 1895, with 1,000-h. p. furnaces.

Carborundum is formed according to the equation

$$SiO_2+3C=SiC+2CO$$

or, in other words, three atoms of carbon reacting with one molecule of silica produce one molecule of carborundum and two molecules of carbon monoxide.

Now taking the weights of the materials necessary for this equation, we have:

Sand (15 pounds) + Carbon (9 pounds) = Carborundum (10 pounds) + Carbon monoxide, (14 pounds)

from which it follows that for every 10 pounds of carborundum produced, there are 14 pounds of carbon monoxide gas.

In the actual manufacture of carborundum the silica is supplied by means of a very pure glass sand, made from crushed quartz and containing about 99.5 percent silica; the carbon is supplied by coke, which is as pure as can be obtained. It has just been shown that for every 10 pounds of carborundum produced, 14 pounds of carbon monoxide gas are set free, so that the mixture of sand and coke must be very porous in order to permit the ready escape of the gas. This porosity is obtained by putting a certain amount of sawdust in the mixture of sand and coke.

The Process of Manufacture.

The various materials used in the manufacture of carborundum are received in the mixing building. The sand is shipped in the ground form, so that it merely has to be stored in the bins; but the coke has to be crushed and ground to powder in a mill, whence it is taken by conveyors to its bin. The coke, sand and sawdust are then mixed in proper proportions and the mixture stored in bins provided for that purpose. From these bins the mixture can readily be drawn off and taken to the furnace building. The latter contains three sets of furnaces, each set consisting of five furnaces. These have the form of a box built of brick, the inside dimensions being approximately: Length, 16 feet; width, 7 feet; depth, 6 feet. The ends of the furnaces are permanent and carry the terminals, which consist of large carbon rods, and are so arranged that they may be connected to the cables carrying the current. The side walls of the furnace are not permanent, but are built up every time the furnace is loaded.

In preparing a furnace for a run, the side walls are first built up and then the furnace is filled rather more than half full with the mixture of sand, coke and sawdust. The next stage, the most important in the building of the furnace, is putting the core in place. The core is an electrical conductor composed of carbon, which serves to connect the terminals of the furnace electrically. After the core has been put in place, more mixture is thrown in the furnace and heaped up until the total height of the loaded furnace is about 10 feet. Nothing now remains but to connect the furnace with the source of the current.

Method of Employing Electricity.

Next to the furnace building is the transformer room, where the current from the power house comes in at 2,200 volts, and is transformed to 150 volts. Beside each

*Read at the meeting of the Foundrymen's Association, Philadelphia, Oct. 7.

transformer is an induction regulator, which consists essentially of two coils which can be moved relatively to one another; one of the coils is connected in series, the other in parallel with the circuit going to the furnace room. By adjusting the relative positions of the coils of the regulator, the voltage of the current going to the furnace room can be either raised or lowered uniformly, with a maximum of about 210 and a minimum of 80 volts. The reason for having this range of voltage is that the resistance of the core, which is the part of the furnace that carries the current, is at first high but diminishes when it becomes hot, and also for another reason which we shall see when we come to consider the products of the furnace.

One furnace such as has been described requires 1,000 horsepower. After it has been connected with the cables in the furnace room, the current is thrown on in the transformer room, and the voltage put up to the maximum. In a very short time the furnace comes to load, that is to say, the resistance of the core drops until the current reaches about 3,500 amperes and the total watts amount to 746,000, or 1,000 h. p. As the resistance continues to decrease the core takes a larger current and consequently the volts must be cut down so as to keep the power constant. Finally the resistance becomes nearly constant, when the amperes are about 7,500, and hence the voltage about 100. The total run lasts 36 hours.

About half an hour after the current is thrown on, a light is applied to the side walls of the furnace, and the carbon monoxide, which by this time is coming off rapidly, ignites with a slight explosion. As the furnace becomes hotter the development of carbon monoxide gas increases till the whole furnace is enveloped in blue flames, presenting a very beautiful appearance.

One of these carborundum furnaces yields about 8,500 pounds of silicon carbide, so from the equation already given it is easily calculated that about six tons of carbon monoxide is generated during the run. At first sight it seems wasteful that all this gas should escape and be burned at the walls of the furnace; but it probably is of value in keeping the walls of the furnace hot, and so diminishing the radiation of heat from the inside of the furnace.

After 36 hours the current is cut off from the furnace and another one connected. For each 1,000-h. p. used there are five furnaces, so that there are 15 furnaces in all for the 3,000 h. p. used by the Carborundum Co. Each 1,000 h. p. produces approximately 4,800 pounds of crystalline carborundum per day, so that the present output amounts to about seven tons a day. The company is at present building a new furnace plant at Niagara Falls, and when this is finished the total power used will be 5,000 h. p., which will give an output of about 11.7 tons a day. In the new furnace room there will be a 2,000-h. p. furnace, probably the largest electric furnace in the world.

Immediately after the current has been cut off from the furnace, the taking down of the side walls is begun, so as to cool the furnace as rapidly as possible. After half the wall is taken down, the unchanged mixture is raked off, and the outer crust of partially converted material is removed. This crust which surrounds the carborundum crystals, is known as "white stuff," and is an intermediate stage in the formation of carborundum. When the "white stuff" has been removed, the crystalline carborundum is exposed, and is taken from the furnace to the crushing room. When the core is removed from the furnace it is found to be converted into graphite, and this is the principal cause of the great reduction in the resistance of the furnace during the run.

After the carborundum is removed from the furnace it is taken to pan mills, where it is crushed and is then placed in large lead-lined tanks and digested with a hot and strong solution of sulphuric acid, after which it is thoroughly washed with water, dried and graded. In washing with water the fine powders are floated off and subsequently collected in settling tanks.

The growth of carborundum manufacture is well illustrated, as follows:

Year.	Output per furnace pounds.	Annual output tons.
1891	¼	0.5
1892	.....	
1893	.....	7.5
1894	300	26.0
1895	3,300	113.0
1896	.....	595.0
1897	7,500	605.0
1898	.....	795.0
1899	.....	867.0
1900	.....	1,200.0
1901	.....	1,920.0
1902	.....	1,870.0
1903	.....	2,311.0
1904 (estimated)	15,000	4,000.0

Processes for Producing Carbon and Silicon.

Before considering the commercial use of carborundum, it will be interesting to note how in the development of its manufacture, commercial processes have also been worked out in the production of its parent elements, carbon and silicon.

Very early in the manufacture of carborundum Acheson observed that when he heated his furnaces to an excessively high temperature, the carborundum was decomposed, the silicon going off as vapor which burnt outside the furnace, or condensed in the cooler parts, while the carbon remained behind as graphite. This gave him the clue to a general method of manufacturing graphite from amorphous carbon by the decomposition of carbides. This has been developed into a successful business for the manufacture of graphite electrodes, which find a large use in electro-metallurgical and electro-chemical processes; also for the production of graphite for use as paint pigment, lubricants, etc.

As regards silicon, a process has been developed for its manufacture. Hitherto silicon, in spite of the fact that it is one of the most widely distributed elements, has only been obtained pure with great difficulty; but now it can be manufactured at a comparatively reasonable price, and will no doubt form a valuable commercial product for the manufacture of silicon alloys and other purposes.

Carborundum in Wheels.

The most important use of carborundum is as an abrasive, for which purpose it is employed in various forms: grains, powders, wheels, hones, paper and cloth. As an example of its use as grains, granite grinding may be mentioned, large quantities of carborundum being used for this purpose. Carborundum in the form of powder is also used extensively for grinding and polishing.

In making up carborundum wheels various materials are used as a bond: porcelain, shellac, and rubber; but except for some special purposes, the first named is used for a large majority of the wheels. In making the vitrified wheels with a porcelain bond the carborundum grains are mixed with clay and feldspar in certain proportions, the mixture moistened with water, placed in strong iron molds, and then put under a pressure of about 2,000 pounds to the square inch with hydraulic rams. The "green" wheels are then taken to the kilns where they are vitrified. There are five kilns at the works, for it takes about one week to fire a kiln, and another week for cooling it. When the wheels are removed from the kiln, they are taken to the lathe room, where they are put in lathes and dressed, after which they are ready for the market. All wheels, however, eight inches or over in diameter, are first tested at double the proper running speed, to make sure that they are not defective in any way that would cause them to burst while in use.

The Question of Safety.

The safety of abrasive wheels is a very serious subject, and one to which it will be worth while to devote a little time, since there seem to be curious misconceptions on the subject. The existence of these misconceptions is well illustrated by the continually recurring question: "Is a carborundum wheel as safe or strong as an emery wheel?"

All manufactured abrasive wheels are composed of two parts, the abrasive and the binding material. The abrasive material, whether it be emery, corundum, or carborundum, is in the form of grains, and these are held together by the binding material, which may consist of sodium silicate, rubber, shellac, or porcelain.

If a ball weighing one pound is attached to a string, and swung rapidly in a circle, at a certain velocity a stress will be developed tending to break the string, this stress being directly proportional to the mass of the ball and to the square of the velocity with which it is moving. It is obviously a matter of indifference whether the ball be made of wood or steel, the stress produced in the string would be the same. On the other hand, if the balls be of the same size, one being made of wood, and the other of steel, then the stress tending to break the string will be different, being directly proportioned to the relative densities of wood and steel.

While the comparison cannot be rigidly applied, yet approximately the grains of abrasive material substance correspond to the ball, the binding material to the string. From this it obviously follows that the question "Is a carborundum wheel as safe as an emery wheel?" implies a misconception of what the safety of the wheel depends on. However, if the densities of carborundum and corundum are compared, and these are 3.12 and 4 respectively, it may be said that if a carborundum and corundum wheel of the same dimensions, and composed of grains of the same size, and running at the same speed, then comparing any carborundum grain with a corundum grain at the same distance from the center of the wheel, the force tending to make the grain of corundum fly from the wheel is about 28 percent greater than that acting on the carborundum grain.

Safe Speed for Wheels.

Prof. Grüber, of Dresden, made a series of tests on abrasive wheels, in May, 1902, for the Association of German Engineers. All manufacturers were invited to submit a 20-inch wheel to be speeded till it burst. About 60 wheels, including nearly all the well known kinds, were tested, and the results showed that all the specimens were safe, if properly used.

The proper working speed for a 20-inch wheel is 955 r. p. m., and the worst record for any wheel tested was 2,615 r. p. m., giving a factor of safety of about 2.7. The carborundum wheel tested gave the highest record, for it did not break till a speed of 4,340 r. p. m. was reached, giving a factor of safety of about 4.5. This was one of the regular carborundum wheels made with a vitrified porcelain bond.

The number of different wheels manufactured from carborundum is great, ranging as they do from dental wheels ¼ inch in diameter, to wheels used for heavy work, and measuring 36 inches in diameter. Besides the regular wheels there is a large number of special shapes, and to these must be added numerous specialties such as rubbing blocks, hones, scythe stones, axe stones, knife sharpeners, and so forth.

At the Niagara Falls works there is also a large department where paper and cloth are coated with carborundum grains.

The characteristic of carborundum that makes it superior to all other abrasive materials is its great hardness. Of substances found in nature, the hardest is the diamond, and next to that, but a long way behind, comes corundum. Carborundum lies very close to diamond in hardness, and has actually been used for polishing diamonds. As a result of this great hardness, carborundum lasts longer, cuts faster, and does better work than any other abrasive substance, and this is the reason why it can compete successfully with emery or corundum in spite of its higher price. As might be expected, the relative efficiencies of emery and carborundum depend to a certain extent upon the nature of the work for which they are used; but in a general way, it may be stated that carborundum is from three to twelve times as efficient as emery.

Corundum and Emery Compared.

An interesting investigation for the purpose of comparing the work done by emery and carborundum wheels, is now under way. Mr. Chalmot, of Cornell University, has made some micro photographs of the metal taken from a paper cutter by an emery and carborundum wheel respectively. These photographs show very clearly the difference in the work done by the two abrasives; the metal taken off by the emery wheel being in the form of globules, while that taken off by carborundum wheel, is in the form of shavings. This shows that the emery wheel simply grinds, the carborundum wheel cuts. Too much stress, however, must not be laid on these preliminary tests, as the investigation has only begun.

One of the distinctive characteristics of carborundum is its very refractory nature. It is quite infusible, even at the temperature of the electric arc, but at that temperature it gradually decomposes, the silicon being vaporized and the carbon left behind as graphite. It is now being largely used where a material that will resist very high temperatures is required.

Carborundum in Foundry Practice.

Finally, a very important application of carborundum has grown up in recent years; its use in the manufacture of steel and in cupola practice, for the purpose of supplying silicon to steel or iron. Carborundum as supplied for this purpose, contains approximately 62 percent silicon, 35 percent carbon and about 3 percent iron and aluminum. In the case of steel, the proper amount of carborundum, in the form of powder, is placed in the ladle, the latter filled and the steel is then ready to draw into the molds.

In cupola practice, the carborundum cannot, as a rule, be used in the ladles, as the temperature of the molten metal is not sufficiently high; but instead it is mixed with the charge. In this case, it cannot be used in the form of powder, since that would be carried out by the blast, but is used in an agglomerated form. By employing carborundum in this work, the cupola may be altogether, or nearly altogether, charged with scrap iron, and nevertheless, good solid castings obtained. Anyone desirous of further information on this point may be referred to a very interesting article by Mr. F. J. Tone, works manager of the Carborundum Co., in *The Foundry* of May, 1900.

American Car & Foundry Co.

The quarterly statement of the American Car & Foundry Co. shows a loss of 10 percent in net profits. The earnings on the common stock are at the rate of 20.6 percent as against 24 percent a year ago. The comparison follows:

	1903.	1902.	Decrease.
Net profits	$2,078,000	$2,322,617	$244,617
Preferred dividends	525,000	525,000	.....
Common dividend	300,000	150,000	*150,000
Surplus	1,253,000	1,647,617	394,617

*Increase.

The common dividend was advanced from 2 to 4 percent a year ago, and the usual quarterly dividend of 1 percent was declared a few days ago, as was the dividend of 1¾ percent on preferred.

Suit has been begun in the United States Circuit Court in San Francisco, by the United States Security & Trust Co., against the United States Shipbuilding Co. and James Smith, Jr., to foreclose a mortgage of $10,000,000. The Union Iron Works is the only asset of the United States Shipbuilding Co. on the Pacific coast.

The appraisement of the Structural Steel Car Works, of Canton, O., has been filed in the United States court. The total valuation is placed at $109,571. The total indebtedness of the company so far as reported is about $80,000.

Manufacturers' Association of Pittsburg

"Organization among manufacturers" was the theme of nearly all the toasts responded to at the banquet of the Manufacturers' Association of Pittsburg, held at the Union Club, Frick Building, on Monday evening, Oct. 12. This gathering of Pittsburg's representative business men, many of them engaged in competitive lines, was a notable event for the reason that the manufacturers of the Pittsburg district have never heretofore taken kindly to employers' associations. That the movement started six months ago, which resulted in the organization of the present association, is successful and has every promise of permanence was attested by the large attendance at the banquet, and the membership will no doubt show a still further growth in the near future.

I. W. Frank was toastmaster, and after a few brief remarks on the good already derived from co-operation among the local manufacturers introduced George Mesta, president, who gave the following account of the Manufacturers' Association of Pittsburg:

A Chapter of History.

"The manufacturers of Pittsburg and vicinity, that is, those employing pattern makers, molders and machinists, have been having meetings and temporary organizations during times of labor troubles for at least 15 years.

"The first meeting I attended was in 1888, when the molders made a demand for an advance of 10 percent in wages. A call was sent out and a meeting was held in a room at the corner of Ninth St. and Liberty Ave. A temporary organization was formed, and after several hours' discussion, a resolution was passed that the demand be refused, and the meeting adjourned. In a few days thereafter, I believe, everyone present paid the advance asked for by the molders, and there were no further meetings of the manufacturers from that time until the next year, when the machinists of Pittsburg and vicinity made a demand for a nine-hour day. Another meeting was then held, in a room at the corner of Fourth Ave. and Market St.; temporary officers were elected, and after full discussion of the matter, no decision was reached. There were no further meetings held, and in a short time most of the manufacturers granted the nine-hour day. The next meeting was held Sept. 26, 1899, and was addressed to the foundrymen of Pittsburg, Allegheny and vicinity. The object was to consider a demand made by the Amalgamated Molders of Pittsburg and vicinity, which was that on Oct. 2 all union molders should be paid a minimum of $3 per day; that all molders receiving $3 per day and over, should be paid an advance of 10 percent; also that time and one-half be paid for all overtime, and double time for Sundays and legal holidays. At this meeting, which was held at 325 Penn Ave., 28 companies were represented. Temporary officers were elected and after a full discussion of the matter it was decided not to grant the demands of the molders. On Oct. 2, the molders quit work in all the shops in Pittsburg district, excepting in a few where the demands were granted. Several meetings per week were held in the Monongahela House, to prevent any of the manufacturers from granting the demands, and also to try to prevent the companies which were working from employing the men who were on strike.

"At this time seven companies in this district were members of the National Founders' Association, which was organized in 1897. These seven members requested the National Founders' Association to aid them in the trouble. Mr. Penton, secretary of the National Founders' Association, was called to Pittsburg and through his efforts the molders went back to work at the same wages they were receiving before the strike, pending arbitration of the matter. A committee on arbitration was appointed, consisting of six members, three representing the National Founders' Association and three the Iron Molders' Union. After two days' discussion of the matter, the arbitration committee failed to agree and adjourned, as the committee representing the molders would not agree to anything but the demands originally made. The next day the molders all quit work again, and as there was no permanent local organization to hold our members together, and as the National Founders' Association only had seven members in this district, the fight was given up and the molders were granted everything they asked for. Some of the manufacturers then began to realize the necessity of a permanent organization and a larger membership in the National Founders' Association.

"There were no further meetings from 1899 until June, 1902, when the International Association of Machinists made a demand as follows:

" 'On and after July 1, none but union men of good standing shall be employed; an advance of 10 percent shall be paid; all overtime shall be paid for at the rate of time and one-half, and double time for Sundays and legal holidays.'

"After receiving this demand, a call was sent out to the manufacturers for a meeting at the Chamber of Commerce Building, June 13. A temporary organization was again formed, and after a full discussion of the demands made by the machinists, a committee of five was appointed to take up the question with the machinists, with full power to act. A number of meetings of the manufacturers was held to hear the reports of the committee, and on June 30, the committee reached an agreement with the machinists for one year, which called for an advance of 5 percent instead of 10 percent, and also provided that the shops be not unionized, but that the general condition should remain unchanged. The committee of five was continued as a standing committee during the term of contract, to adjust any difference of opinion that might arise during the year in regard to the contract. The agreement was lived up to by both sides, and the committee was only called together a few times to adjust differences. In one case, however, the question had to be referred to arbitration for settlement.

"On June 13, of the same year, the molders also made a demand for an increase of the minimum from $3 to $3.20 per day and 10 percent general advance. A committee was also appointed to take up the question with the molders, and an agreement was reached for one year, which called for the minimum rate to remain the same—$3—and an advance of 20 cents per day, instead of 30 cents.

"All this was done without any permanent organization. No further meetings were held until April of this year, when a demand for increase in wages and many other things, was made by the pattern makers, molders and machinists. About this time some of the manufacturers again began to realize that it was time to have a permanent organization, and in this room on April 23 the name The Manufacturers' Association of Pittsburg was adopted and a permanent organization formed. The association then took up the demands made by the pattern makers, molders, and machinists, and the result was, that agreements were reached and contracts signed, with molders and machinists, but no agreement could be reached with the pattern makers, who went out on strike on May 18. The association did all it could to get in new men and assist the members in every way, and none of the shops were seriously handicapped. After being out on strike for 90 days, they asked to go back at the same wages, but the association refused this, as most of the shops were well filled with non-union men, at lower wages than they were paying pattern makers before the strike. A few days ago they decided their case was hopeless, and the strike was declared off.

"I feel confident that had it not been for the Manufacturers' Association of Pittsburg the molders and machinists would have gotten all they asked for and the pattern makers would have won their strike. The association expects to accomplish good results, in addition to adjusting labor troubles. In a short time we expect to have a uniform apprentice contract. A committee has been appointed to take up this matter. The association also expects to prevent apprentices from leaving their employers before the expiration of their time and seeking employment elsewhere at higher wages. Our association has also introduced a Labor Bureau and many other things which our secretary will explain."

Growth of Association.

Secretary F. H. Zimmers explained the workings of the association, and stated that at a meeting held on May 6, 1903, the organization of the Manufacturers' Association of Pittsburg was completed by the election of the following officers: George Mesta, president; I. W. Frank, vice president; Jos.

A. Speer, treasurer; executive committee, W. H. McFadden, John Jackson, G. E. Brush, Stewart Johnston. Continuing, he said:

"The association started with a membership roll of 37. The meeting adjourned, and at an executive meeting held immediately after a secretary and assistant secretary were elected. As a home for the association, rooms 902 and 903, Lewis Block, were selected and furnished, equipped with both telephones, etc., and were occupied and ready for business on May 20.

"In connection with its other business, it was decided to form a labor bureau, and in July this was put in operation. We started with 5,150 operatives, and at the present have 46 firms representing 6,319 operatives.

"The association is governed by the officers in connection with the executive committee, who are subject to the call of the president, and all matters are taken up and discussed by this committee, all complaints are investigated and adjusted by them.

"The labor bureau is a new institution in Pittsburg, and is modeled somewhat after the kindred association in Cincinnati, managed by our friends, the National Metal Trades Association. The objects of the bureau are: 1. To have a complete record of all employes of the members of our association in card file indexes, giving their names, addresses, age, married or single, nationality and specialty with a record of where they learned their trade and where they have worked. 2. The card file indexes are arranged alphabetically under firms and by names. The unemployed are also arranged alphabetically, so that a minute's notice will show where a man is working and at what branch of the business. If he is unemployed we have his name and address and where he worked last (if employed by our members).

"It is hardly necessary to speak of the advantage of this system to an assembly of employers of labor like this. Large cards printed in bold type are posted in the shops of our members calling the attention of our employes to the labor bureau and the advantages to be derived from it, and they are encouraged to make use of it. The manner of using it by our members is like this: A member desiring a planer hand calls up the bureau office, and says he wants a planer hand, and is willing to pay so much. The bureau looks over the list of unemployed, selects a man, and sends him to the member with a card. This card the member returns to the bureau, marking on it whether he employs him or not. At the same time the member can ascertain from the office where he worked last, his rate of wages and his record. The advantages of this need hardly be dwelt upon.

"Prior to the labor bureau our members often employed unfit men, as there was no way of checking up a man's statement, except to try him, this often causing a loss of time and money to the employer. The saving in this line alone will be many times the cost of the organization. We also believe the bureau will have a good effect in this district, as poor workmen and troublesome men will soon find that they are not wanted in the shops of our members. A list of the men hired and discharged every day is forwarded the office upon blanks furnished. When a man is discharged by a member and reported, the cause is given and his rate of wages. This enables the bureau to give the information to the member hiring the man, and prevents the member paying any higher rate of wages than the man was paid at the last place he worked. This also prevents a man from misrepresenting about his wages.

"The bureau prevents one member from hiring another member's men. The bureau aims to get the confidence of the employe by finding him employment when possible, by investigating any complaints that have reasonable grounds. It has a tendency to equalize the rate of wages paid in the shops of our members. It has facilities to procure labor on short notice. It is in touch with similar organizations in all of the larger cities in the United States. The cost of the association to our members has been reasonable. An assessment of 80 cents per full operative will pay our expenses for six months, including an outlay of several hundred dollars to fit up and furnish our offices.

"The office is in a central location, easily accessible and always ready for meetings of our members, either as a whole or in small committees. As an information bureau, we have an average of 50 calls per day over our 'phones. This of itself would show we are doing some good work. We believe we are earning the respect and confidence of our individual employes, and in that way bring about a better understanding among the men and our members. We would also say that we have a few of our members who do not take advantage of our bureau because they have not taken the trouble to study it up and investigate its workings. We also believe that if more of our manufacturers would take time to study the merits of our association they would undoubtedly join. Our membership is such that we now dictate the terms of settlement of our labor troubles to outsiders. They should join and help to bear the burdens and lessen the expense for all.

"Our association, as has been briefly described, has certainly had an effect on labor unions, and if we can continue and increase our membership as we should, it will tend to the betterment of all and put us in such a position of influence that we will be enabled to do more and more."

E. F. DuBrul, commissioner of the National Metal Trades Association, of Cincinnati, was next introduced, and he told of the good work that had been accomplished in Cincinnati and vicinity through the organization of manufacturers. He said that much hostile legislation was introduced in the Ohio Legislature at its last session by the labor interests, and by the aid of a powerful lobby they would have succeeded in passing their measures but for the successful work of the manufacturers' associations throughout the State. At present he stated that there was a movement on foot in Cincinnati to organize a General Employers' Association, and on Oct. 29 there will be held in Chicago a meeting of the representatives of all the manufacturers' organizations in the United States for the purpose of organizing an American Federation of Employers.

John A. Penton, of Detroit, gave a history of the National Founders' Association and told of his experiences as commissioner of that body. Before closing his remarks, he said that he had just received a telegram stating that a molders' strike at Birmingham, Ala., which has been on for more than a year, has been called off by the union unconditionally.

Paul Blatchford, secretary of the Chicago Metal Trades Association, told of the tremendous growth of the union labor movement in Chicago and of the good that has been accomplished by the organization of manufacturers. R. Munroe, Jr., of Pittsburg, secretary of the Boiler Manufacturers' Association of Pittsburg and vicinity, gave a brief history of its formation and told how by united effort the boilermakers were compelled to recede from outrageous demands made last spring. J. T. Speer, Prof. J. A. Brashear, Fred Miller, editor of the *American Machinist*, and W. H. McFadden also responded. Letters of regret from W. H. Pfahler, of the Abram Cox Stove Co., Philadelphia, C. A. Marshall, of the Employers' Association, of Dayton, O., and J. A. Stone, of Cleveland, were read. The letters from Messrs. Pfahler and Marshall are given below:

Letter from W. H. Pfahler.

I. W. Frank, Chairman Committee of Manufacturers' Association of Pittsburg, Pittsburg, Pa.

My Dear Sir:—On my return from a short vacation abroad, I found your letter of the 2d, and with it an invitation to attend the dinner to be given by your association on Oct. 12 at the Union Club. I do not need to assure you personally that there could be no greater pleasure than being with you on that evening, but I find so many matters pressing on account of my absence that it will be impossible for me to accept.

I remember with great pleasure the meeting of nearly two years ago, to which you refer, because I was strongly impressed then with the thought that when business men, or manufacturers especially, will lay aside those peculiar environments which prevent genial association, the natural conditions will bring them together upon the propositions in which they have a common interest.

Today, and for a long time in the future, it seems not only possible but probable that no respect will be given to the rights of a manufacturer unless he can, by co-operation with his fel-

low manufacturers, demand the recognition to which he is entitled. As a manufacturer, no matter what the line of his industry may be, or to what extent he is engaged in it, he is simply and purely an assembler.

With the capital which he may have to invest he creates a plant in which material and labor are brought together for the production of such articles of necessity or luxury for which he can find a buyer. He occupies, therefore, a dual position: 1. It is for him to keep employed capital which would otherwise retire from business and deplete the active wealth of the country. 2. He must conserve the interests of the consumer by keeping the cost of production at a point which is not prohibitive. To do this he must deal with labor upon a fair and equitable basis, having in view one of two alternatives, either a price paid for labor which will deprive it of work, or a price which will deprive it of the fair share of earning power.

My experience with manufacturers has been that there are very few who do not approach this duty conscientiously and with the hope that their labors may keep the two classes, consumer and producer, upon an equitable basis.

When, therefore, by reason of a slight overproduction, or from any other cause a manufacturer grasps an opportunity, by reduction of wages or the selling price of the article he manufactures, to increase his wealth by competition, he makes a standard which sooner or later is followed by his competitors and then occurs a loss of profit and reduction in wages which causes a stagnant market. It is to prevent things of this kind that the co-operation of manufacturers offers a solution to problems which will arise in the future; co-operation fixing values for their product as well as in determining the value of that which shall enter into their product, be it material or labor.

I am glad to see the movement now going over the country along this line and feel sure that the result will be of great value to the local industries represented, and in presenting the subject to manufacturers generally, I am free to say to you that no one has as yet been able to give me a reason for not becoming an active member of such an association.

W. H. PFAHLER.

Letter from A. C. Marshall.

Mr. I. W. Frank, Chairman.

My Dear Sir: I regret exceedingly that official duty in connection with the organization of the National Federation of Employers makes it impossible for me to be present at the meeting of the Manufacturers' Association of Pittsburg on the 12th inst. and to speak to your members concerning the benefits of organization. Our home city affords an excellent object lesson, a more forceful illustration than any argument I can make.

For years Dayton was known as a "labor stronghold," "the banner organized town of the country." The unions were in control of the industrial conditions of the city. The law was openly violated; the rights of the business men and independent workmen were ignored. Intimidation, coercion boycotting and lawlessness of all kinds prevailed. Brutal and murderous assaults were of frequent occurrence. The newspapers, police department, courts and politicians recognized the power and influence of this active and powerful force in the community, and submitted almost unconsciously to its dictation. The wage earners lost more than a million dollars in the year 1900 as a result of strikes.

The Dayton Employers' Association was organized in June of that year. As a result of this organization, all of these strikes, which involved almost every department of the industries of the city, were failures in every respect. Not in a single instance were the demands for concessions in wages, hours, reinstatement of discharged men, cancellation of orders based on sympathetic strikes, and a score of other so-called "grievances" granted by any employer. It was a fight to a finish, long and expensive, but it was a victory worth its cost, for it secured and has maintained industrial peace in the fullest possible sense. It is impossible to describe the change made throughout the entire city, or exaggerate the beneficial effects of the organization of the employers' association. Public sentiment realizes its power and approves its policy. All classes of the community, and especially wage earners, understand and appreciate the benefits it confers. Labor leaders are restless under the conditions which prevail in Dayton, but if any material change is made it will be the adoption of the "open shop" policy or the non-unionizing of the industries of the city. Not only the employers but 80 percent of the workmen are ready for the change and will welcome action leading up to it.

The Dayton Employers' Association includes employers engaged in every class of business—manufacturers, building contractors, merchants, any and every class of business men, and herein is the secret of its influence and success. Industrial peace in the fullest sense with all implied blessings and benefits is the reward which has come to the city in all departments of business, industry and labor, as a result of the organization of the employers' association and its broad and comprehensive policy. Contrast the gratifying conditions which have prevailed in Dayton for more than two years with those of cities in which there is no organization, or where it is limited to separate businesses or crafts instead of being combined in one association.

Organization, local, state and national, should be the watchword. The country's greatest need, the citizens' most important duty, is the formation of organizations of the employers of the country and a national federation of these associations, more than a thousand of which are now in existence.

When the proposed National Federation of Employers is formed, local and state organizations will be rapidly extended under its supervision and it will soon become so representative and powerful that the business interests of the country, aided by free and independent workmen, can meet the American Federation of Labor on its own ground, defeat its unlawful undertakings, counteract its baneful influence and restrain its evil tendencies.

I give you as a sentiment, "the open shop, the right of the American boy to learn a trade." A. C. MARSHALL.

Members and Guests.

The following were in attendance:

G. E. Brush, J. S. Stephens, Ernest Cramer, Brush & Stephens.
A. W. Cadman, R. W. Cadman, A. W. Cadman Mfg. Co.
W. J. Carlin, W. C. Scott, Thos. Carlin Sons Co.
John N. Early, James S. Early, W. J. Early & Sons, Ltd.
Thos. Fawcus, Fawcus Machine Co.
I. W. Frank, Edward Kneeland, C. E. Sattler, Frank-Kneeland Machine Co.
Fred F. Fischer, Fischer Foundry & Machine Co.
H. C. Shaw, John H. Ricketson, A. Garrison Foundry Co.
George A. Hogg, F. I. Freeman, Hogg Iron & Steel Foundry Co.
E. W. Heyl, Heyl & Patterson.
Fred Schuckman, Homestead Valve Mfg. Co.
L. H. Davis, W. A. Harris, Lewis Foundry & Machine Co.
W. M. McCullough, William Marshall, Marshall Foundry Co.
A. Hufschmidt, J. & J. B. Milholland.
George Mesta, F. E. Mesta, C. J. Mesta, I. O. Horning, Mesta Machine Co.
W. H. McFadden, Mr. Mackintosh, Mackintosh-Hemphill & Co.
John H. Nusser, National Gear Wheel & Foundry Co.
C. W. Heppenstall, S. Heppenstall, Pittsburg Shear Knife & Machine Co.
John A. McLaren, W. J. Phillips, Phillips & McLaren.
G. V. Milliken, Pittsburg Mfg. Co.
Joseph T. Speer, Charles A. Anderson, C. R. Rhodes, Pittsburg Valve, Foundry & Construction Co.
C. D. Alcorn, E. W. Salts, Pittsburg Pulley Co.
Stewart Johnson, August Trump, Pittsburg Steel Foundry.
G. P. Rhodes, Pennsylvania Casting & Machine Co.
Thomas Ward, Pittsburg Brass Mfg. Co.
C. W. Jones, Rosedale Foundry Co.
J. R. Robinson, Robinson Machine Co.
John Jackson, Biddle Arthurs, Simonds Mfg. Co.
W. M. Hamilton, Specialty Mfg. Co., Ltd.
J. S. Seaman, C. B. Seaman, Seaman-Sleeth Co.
George L. Burton, W. McLean, Standard Pattern Co.
Robert Taylor, H. M. Wilson, Taylor-Wilson Co., Ltd.
C. C. Smith, Joseph Allen, Union Steel Casting Co.
F. H. Zimmers, Union Foundry & Machine Co.
August Snyder, Wilson-Snyder Mfg. Co.
F. D. Cope, assistant secretary Manufacturers' Association.
W. C. Gentry, Manufacturers' Association.
Mr. Ayers, American Locomotive Co.
T. M. Armstrong, Armstrong Cork Co.
Henry C. Bair, Bair & Gazzam Mfg. Co.
C. W. Bradley, Jr., Bradley Mfg. Co.
John A. Penton, Detroit, Mich.
Paul Blatchford, Chicago, Ill.
E. F. DuBrul, Cincinnati, O.
Daniel Fox, Fox Copper & Bronze Co.
Charles Slocum, Keystone Car Wheel Co.
Edward Kerr, Lawrenceville Bronze Co.

C. H. McKenna, W. H. McKenna, McKenna Bros. Brass Co.
R. Munroe, Jr., R. Munroe & Son.
T. R. Diamond, Magnus Metal Co.
W. R. McKean, W. C. Coffin, Riter-Conley Mfg. Co.
Henry Spilker, Sterritt-Thomas Foundry Co.
Mr. Holbrook, Pennsylvania Malleable Co.
W. A. Bole, Westinghouse Machine Co.
L. P. Thompson, National Metal Trades Association.
Taylor Alderdice, National Tube Co.
G. G. Crawford, National Tube Co.
Robert A. Walker, *Iron Age.*
A. O. Backert, *The Iron Trade Review.*
Prof. J. A. Brashear.
F. R. Dravo.
Fred J. Miller, *American Machinist.*

Membership.

The following are the members of the Manufacturers Association of Pittsburg:

Best Mfg. Co., 25th and R. R. Sts.
Brush & Stephens, 106 Penn Ave.
A. W. Cadman Mfg. Co., 2816 Smallman St.
Chaplin-Fulton Mfg. Co., 28 Penn Ave.
Thos. Carlin's Sons Co., 1600 River Ave., Allegheny.
Chilled Roll Foundry, Vandegrift, Pa.
W. J. Early & Sons, Ltd., 812 Sarah St.
Fawcus Machine Co., 2828 Smallman St.
Frank-Kneeland Machine Co., 54th St.
Fischer Foundry & Machine Co., 21st St.
A. Garrison Foundry Co., 9th and Bingham Sts.
Hall Steam Pump Co., 213 Grant Ave., Allegheny.
Geo. A. Hogg, I. & S. Foundry Co., 24th St.
Heyl & Patterson, 51 Water St.
Homestead Valve Mfg. Co., Homestead, Pa.
Keystone Bronze Co., 38th St. and A. V. Ry.
Lewis Foundry & Machine Co., 10th and Bingham Sts., S. S.
Lincoln Foundry Co., Butler and 60th Sts.
McGill & Co., 27th and Smallman Sts.
J. & J. B. Milholland Co., 714 Fifth Ave.
Mesta Machine Co., West Homestead, Pa.
Mackintosh-Hemphill Co., Foot 12th St.
The Marshall Foundry, 28th St.
Marshall Bros., 21st and Mary Sts., S. S.
Monongahela Mfg. Co., Monongahela, Pa.
National Gear Wheel & Foundry Co., South Ave., Allegheny.
Phillips & McLaren, 2400 Smallman St.
Pittsburg Valve, Foundry & Construction Co., 26th St. and A. V. Ry.
Pittsburg Mfg. Co., 28th St. and A. V. Ry.
Pittsburg Shear, Knife & Machine Co., 47th St.
Pittsburg Brass Mfg. Co., 107 Wood St.
Pittsburg Steel Foundry Co., 541 Wood St.
Rosedale Foundry Co., 151 Preble Ave., Allegheny.
Reliance Pattern Co., 3204 Smallman St.
Robinson Machine Co., Monongahela City, Pa.
Simonds Mfg. Co., Liberty Ave. and 25th St.
Specialty Mfg. Co., 7 Frazier St., Allegheny.
Standard Pattern Co., 3rd Ave. and Ferry St.
Seaman-Sleeth Co., 41st and Willow Sts.
Taylor-Wilson Co., Ltd., Grant Ave., Allegheny.
Samuel Trethewey & Co., 47th and Plumer Sts.
Union Foundry & Machine Co., 224 W. Carson St., S. S.
Union Steel Casting Co., 61st St. and A. V. Ry.
Wilson-Snyder Mfg. Co., 2 Ross St.
Pittsburg Pulley Co., 1111 Frick Bldg.
Penna. Casting & Machine Co., 505 Preble Ave., Allegheny.

New York newspapers state that, after several meetings of creditors and important stockholders, it has been decided to reorganize the International Fire Engine Co., which is capitalized at $9,000,000. Charles E. Bocke, vice president, and George R. Bidwell, former collector of the port of New York, and managing director of the combination, have resigned. A committee has been appointed to draw up a new scheme of capitalization and readjustment of the company's finances and a report is expected in a few days. Dividends at the rate of 7 percent were paid since 1901 on the preferred, but it was found necessary to pass the declaration in August. The stock is not widely distributed. The company has a controlling interest in properties at Chicago, Cincinnati, Cleveland, Baltimore, Elmira and Seneca Falls, N. Y., St. Paul, Minn., and Worcester, Mass.

The wire, wire nails and pipe exports made by the American Steel & Wire Co. and the National Tube Co., branches of the United States Steel Corporation, through New York and other Eastern seaboard points last month aggregated about 6,500 tons, being a slight increase over similar exports made in August, and a decrease of about 50 percent when compared with the July shipments abroad.

THE CLAIRTON STEEL CO. PURCHASE DROPPED.

The deal for the sale of the Clairton Steel Co., one of the subsidiary companies of the Crucible Steel Co. of America, ratified at a meeting of the board of directors last July, by which the United States Steel Corporation was to secure one-half interest in the plant at Clairton, Pa., and about 20,000,000 tons of ore in the Lake Superior region, has fallen through. It is officially stated, however, that the company will be independently financed and steps looking toward the consummation of a deal of this kind have already been taken. What the plans are has not been given out, but it is probable that inducements in the way of stock will be given for the further purchase of bonds. The reason for the refusal of the United States Steel Corporation to accept a half interest on the lines laid out has not been made public, although it has been intimated that the proposition to own only a half interest in a plant one-eighth of whose product would be disposed of to independent finishing mills was not satisfactory to the executive committee of the steel corporation.

The deal for the sale of the Clairton Steel Co., as ratified by the directors of the Crucible Steel Co. of America, provided that the United States Steel Corporation acquire a half interest in the property by the payment of $4,000,000 in cash into the treasury of the Clairton Steel Co. W. P. Snyder & Co. were to retain one-eighth interest for the payment of $1,000,000, and the Oliver Iron & Steel Co., of Pittsburg, was to secure one-eighth interest for the payment of $1,000,000 in cash into the Clairton treasury, making $6,000,000 in all. The Crucible Steel Co. of America was to retain one-fourth interest without the necessity of paying any cash into the Clairton treasury. The date first fixed for paying this money was Sept. 1, but postponements were made from time to time. All of the stock of the Clairton Steel Co. outstanding is owned by the Crucible Steel Co. of America and amounts to $3,500,000. There are also bonds to the amount of $10,250,000 bearing 5 percent interest. The sale of the bonds netted the company a little over $9,000,000, while the cost of the ore properties, blast furnaces and steel plant is placed at $12,500,000. The bonds at present bear the guarantee of the Crucible Steel Co. of America, but it has never been made clear whether this guarantee would have been continued had the sale been consummated.

On Tuesday, Oct. 13, the stock of the Crucible Steel Co. of America suffered a big slump on the Pittsburg Stock Exchange, the preferred bearing 7 percent interest selling at 35 and the common 5⅛. On July 15, when the ratification of the sale by the directors of the Crucible Steel Co. of America was announced, the common sold at 13½ and the preferred at 78⅜. These were low prices, but since that time the quotations have continued to go off.

It is now announced that the Clairton Steel Co. will enter the field as a producer of both sheet and tin bars and will supply the independent sheet and tin plate mills, who suffered for want of steel during the two years preceding the present depression.

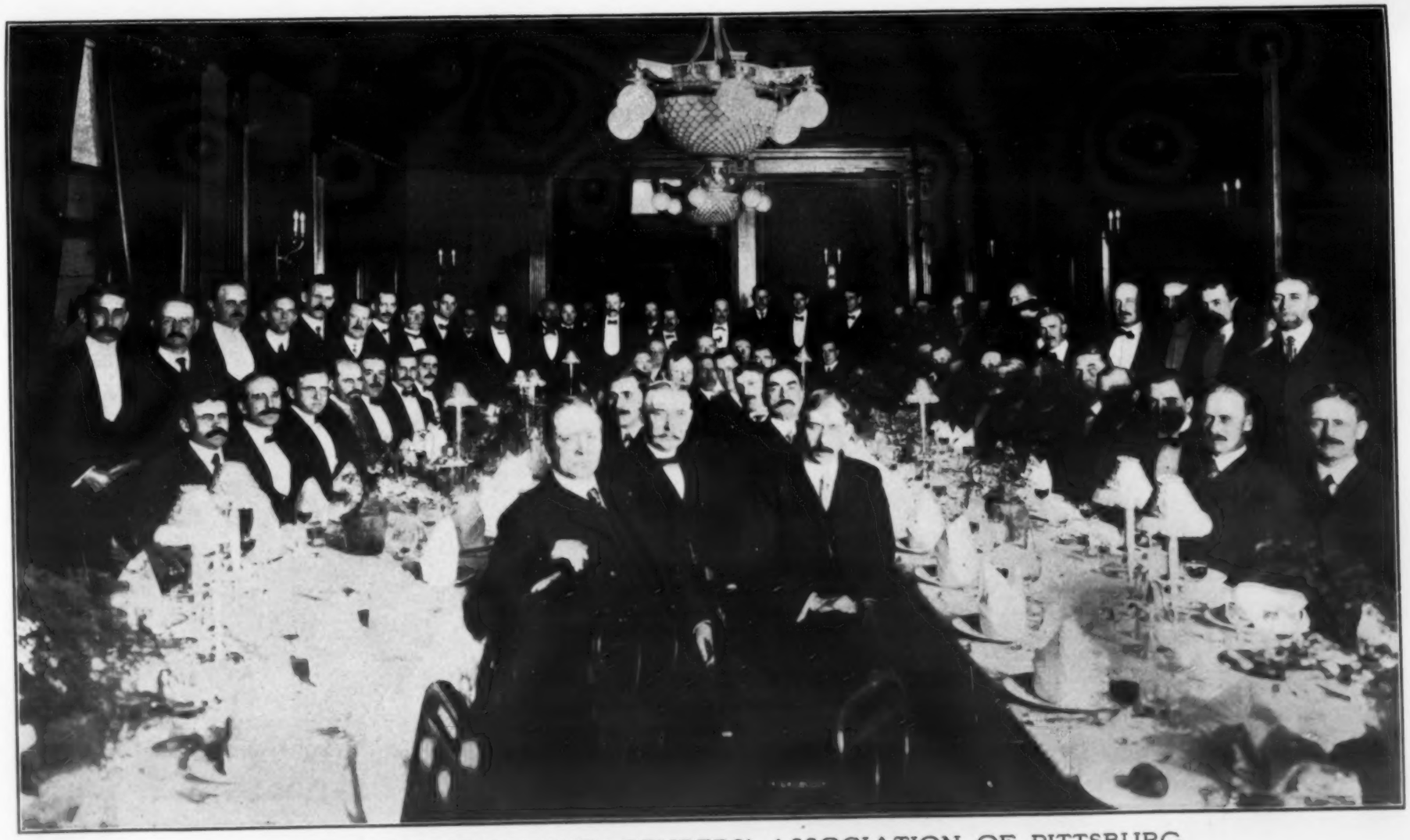
Many rumors were circulated in Pittsburg on Monday and Tuesday of this week, one to the effect that a receiver would be appointed for the Crucible Steel Co. This was promptly denied. The annual meeting of the company will be held in New York next week and the report for the last fiscal year will show earnings almost as great as in the previous year, while the amount of business now being done is very satisfactory. In the issue of *The Iron Trade Review* for July 16, 1903, further details of the operations of the Clairton Steel Co. are given.

To Finance Clairton Steel Co.

(Special Telegram.)

PITTSBURG, Oct. 14.—Meetings of directors of the Crucible Steel Co. of America and of the Clairton Steel Co. are being held today for the purpose of financing the Clairton company independently. Heavy subscriptions have already been made and the indications are that the deal will go through successfully.

The Bloomfield Mfg. Co., Bloomfield, Ind., has just added a foundry with a five-ton cupola to its equipment.



DINNER OF THE MANUFACTURERS' ASSOCIATION OF PITTSBURG,
AT PITTSBURG, OCTOBER 12, 1903.

SUPPLEMENT TO
THE IRON TRADE REVIEW
OCTOBER 15, 1903.

New Steel Plant and Merchant Bar Mills of the International Harvester Co., at South Chicago, Ill.

The International Harvester Co. has now in operation at South Chicago, Ill., on the west bank of the Calumet river, a complete blast furnace, steel and merchant bar plant, with all the necessary accessories such as machine, blacksmith and carpenter shops, foundry, laboratory, etc. Except one blast furnace, the entire equipment is new. The International Harvester Co. owns all the stock of the South Chicago Furnace Co., which in 1899 purchased the plant and properties of the Calumet Iron & Steel Co., the latter having a 78x16-foot stack, built in 1881, with a capacity of 250 tons a day, and formerly known as the Calumet furnace. An additional blast furnace has been built by the harvester company, with a capacity of 350 tons a day, and provision has been made for the future erection of three more furnaces which will be built as the needs of the company require. The new furnace is located northeast of the old one, but nearer the river. The old stack may be torn down when the company is ready to build the further new furnaces. The mixers, converters, blooming and billet mill and continuous merchant mill are located as a unit to the north of the blast furnace.

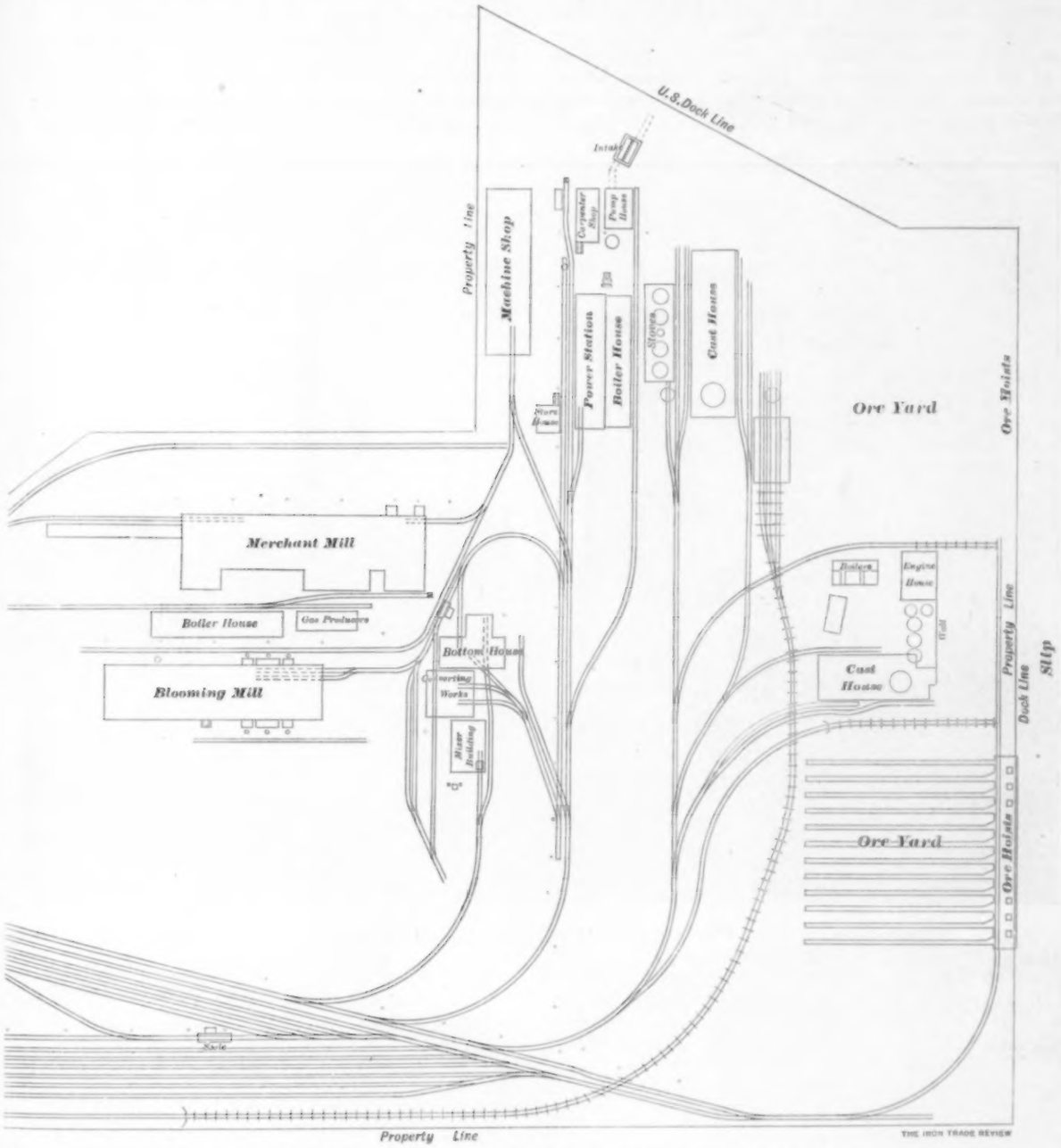


FIG. 1.—PLAN OF THE INTERNATIONAL HARVESTER CO.'S BLAST FURNACE, STEEL WORKS AND MERCHANT MILL AT SOUTH CHICAGO, ILL.

Provision for Raw Materials.

For a considerable time before the formation of the harvester machinery combine, it was known that the Deering interests at Chicago were laying plans which would make them in large measure independent of the iron and steel market. The company acquired iron ore properties, consisting of the Hawkins and Agnew mines in the Hibbing district on the Mesabi range, first shipments from which were made in 1902; has two mines in the Crystal Falls district on the Menominee range, and has options or leases on about 640 acres of land near North Freedom, Sauk county, Wis., on what is known

as the Baraboo range, on all of which has been developed a total of over 35,000,000 tons of ore of Bessemer and non-Bessemer grades—enough to supply the International Harvester Co.'s requirements for the next 50 years.

The company's plans have also widened to the extent of providing a supply of metallurgical fuel that will meet its wants for a like period. Limestone alone of the raw materials of blast furnace operations will be bought in the open market. Its fuel resources consist of about 20,000 acres of coking coal lands in Harlan county, Ky., in what is known as the Stonega district. This land has been thoroughly explored and investigated, and there are five workable seams of coal, of which three are coking, giving 15,000 tons of coking coal to the acre. Experiments made with this coal have demonstrated that it is fully equal to any in the Stonega district, which by many is considered to be equal to Connellsville coking coal for furnace operations. A great advantage which the company enjoys in drawing its fuel supply from this district is that the freight rate to Chicago is no higher than from the Connellsville region, and at times has been less. It thus enjoys equal advantages in the production of pig iron with other producers, and is at the same time independent of the fuel market. The company proposes in the near future to erect a sufficient number of coke ovens at the mines to supply a blast furnace capacity of 200,000 tons a year.

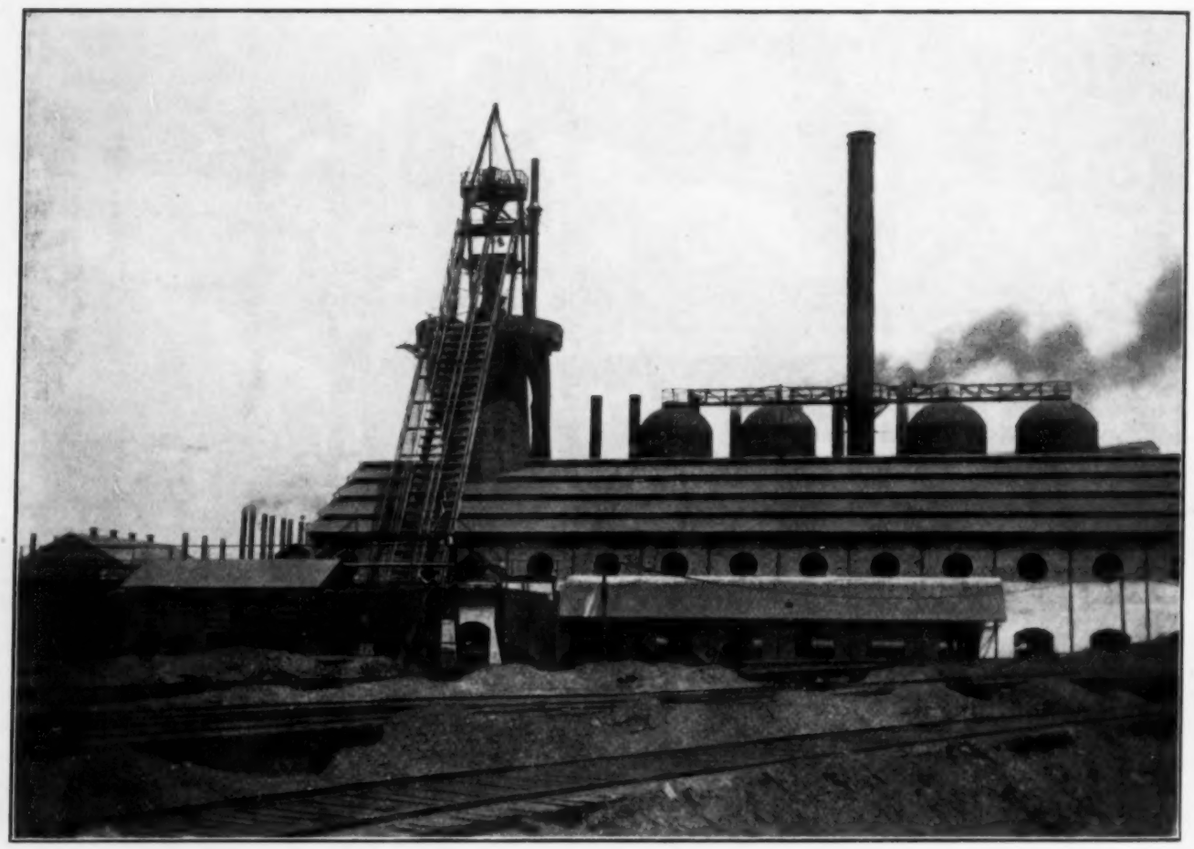


FIG. 2.—VIEW OF BLAST FURNACE SHOWING DOUBLE SKIP HOIST.

Ore Handling Equipment.

The plant being located on the Calumet river will receive its ore direct from the vessel without railroad service of any kind. At the present time, the ore is unloaded at two docks, one of which has eleven and the other twelve Champion A-frame hoists. The ore yard which now has a capacity of 246,000 tons can be extended as fast as new furnaces are constructed, and there will be ample room for storing all the ore necessary for the production of 500,000 tons of pig iron per year. It is proposed eventually to install the Hoover & Mason type of automatic unloading machinery, the general scheme of which is well expressed in the outline sketch shown in Fig. 1, the arrangement being similar to that of the Illinois Steel Co., which was described in *The Iron Trade Review*, Sept. 1, 1902. Fourteen Hoover & Mason pockets have thus far been built. The ore bridges and other equipment will be installed later. Described briefly the unloaders will be placed upon the dock and deliver the ore into a trough immediately to the rear, from which it will be taken and stocked or carried to the furnaces by large bridges which will command the entire ore yard, furnace pockets and coke reserve stock. The ore, coke and stone pockets are of the Hoover & Mason roller type and provide for a 24 hours' supply of ore and stone and 18 hours' supply of coke. The furnace is supplied by a single car and operator, the scale car being equipped with the recording mechanism for weighing charges automatically. The pockets will be heated by waste gases from the furnace in a manner similar to the plant at the Illinois Steel Co., a system which proved last winter a great success. During the extremely cold weather of January, it was not found necessary at this plant to add a single man to the force required during the summer, and practically the operations ran along the same during winter and summer. This condition is contributed to by the fact that the bridge operator is able to pick and choose from the ore pile, and thus avoid taking frozen or even cold ore to the pockets.

The coke pockets are commanded by two tracks. The coke being received so largely, in box cars, two tracks were found necessary in order to unload the coke rapidly enough to keep the furnace going. The arrangement permits the spotting of six coke cars for simultaneous unloading.

Scope of Steel and Finishing Plants.

The steel making plant was originally designed to serve only the needs of the Deering Harvester Co., but due consideration was given in all cases to possible needs for expansion; and the plant has today ample steel producing and blooming capacity to supply the entire needs of

the International Harvester Co. The merchant mill cannot produce all of the great variety of shapes and bars used by the company, but there is plenty of room for additional mills to do so. It has also been contemplated that other mills might be erected in view of the heavy tonnages required, such as sheet mill, etc. The plant is unique and important because it is the first instance in which a merchant mill has been equipped with a Bessemer plant to supply steel in small quantities. The Morgan continuous bar mill is also the first of its kind to be built to produce such a variety of product and consequently is of great interest.

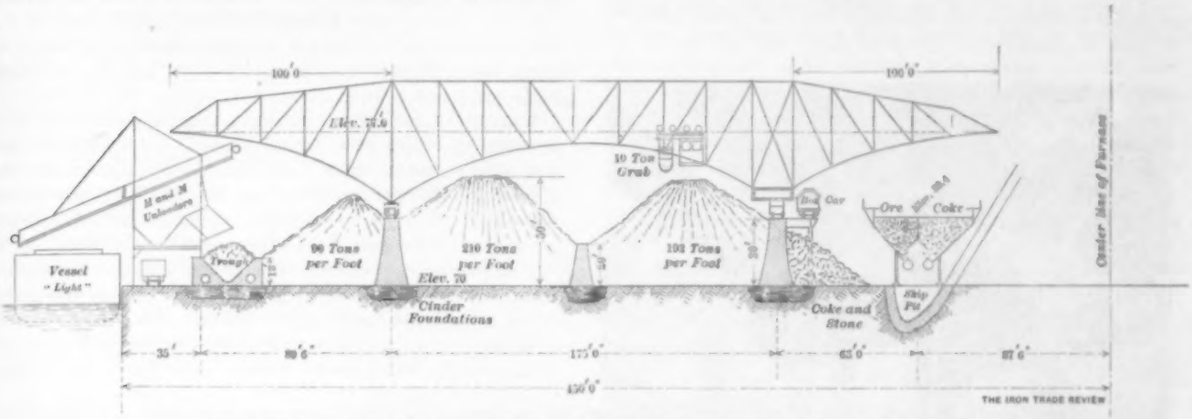


FIG. 3.—SECTION OF PROPOSED HOOVER & MASON ORE UNLOADING AND STORAGE PLANT.

In deciding on the type of steel making plant, the open-hearth process was the first to be considered in view of the moderate tonnages required, but further consideration suggested the possibility of the use of the Bessemer process, especially in view of the fact that the company's ore and coke supply permitted the economical manufacture of Bessemer pig iron. This question received careful consideration and it was finally decided to adopt the Bessemer process. It was believed entirely possible to utilize this process for moderate tonnages by operating on day turns only, and at the same time to accomplish economy over the open-hearth plant, considering first cost of plant, cost of operation, average cost of pig iron, scrap, etc., and the immediate possibility of very great increase in capacity. The great bulk of the material used by the company in the manufacture of its harvesting machines is Bessemer steel, and such open-hearth steel as may be required will be secured by the exchange of Bessemer billets or made in a small additional open-hearth plant, which may be built later. It is therefore to be borne in mind that the Bessemer department was designed for economical operation on single turn at moderate tonnages; and this feature explains many of the arrangements, which are somewhat unusual, such as having the boiler and blowing engine plants located at the blast furnace power station and the hydraulic plant located in the blooming mill.

The Power Plant.

Furnace gas is burned under the boilers to furnish power for the pumping plant for the whole works, current for the whole works, and air for both furnace and converters. This is done through a battery of ten 350-horsepower Stirling boilers, located at the furnace. Steam from these boilers drives:

(1) *The Pumping Plant.*—Water is taken directly from the Calumet river and delivered to a standpipe by two Roots rotary pumps, of 10,000,000 gallons' capacity each in 24 hours, each driven by a 14 and 16 and 16 by 20-inch three-cylinder compound engine made by the same firm.

FIG. 4.—BLAST FURNACE AND HOOVER & MASON ORE POCKETS.

(2) *The Electric Plant.*—Two Westinghouse generators of 250-k. w. capacity at 250 volts and 150 revolutions are each driven by a Buckeye cross-compound condensing engine, 15¼ and 28½ by 30 inch. The current furnishes light for the entire plant, operates the furnace skip, drives the cranes throughout the plant, and operates a

number of shears and billet and bar conveyors.

(3) *The Blowing Engines.*—For the blast furnace there are three Westinghouse Machine Co. blowing engines and for the converters one Morgan Engineering Co. blowing engine. The furnace blowing engines comprise two high pressure engines, each with 50-inch steam and 96-inch air cylinder, 66 inches stroke, and one low pressure, with 96-inch steam and 96-inch air cylinder and 66 inches stroke. These are of the vertical long crosshead type, and of

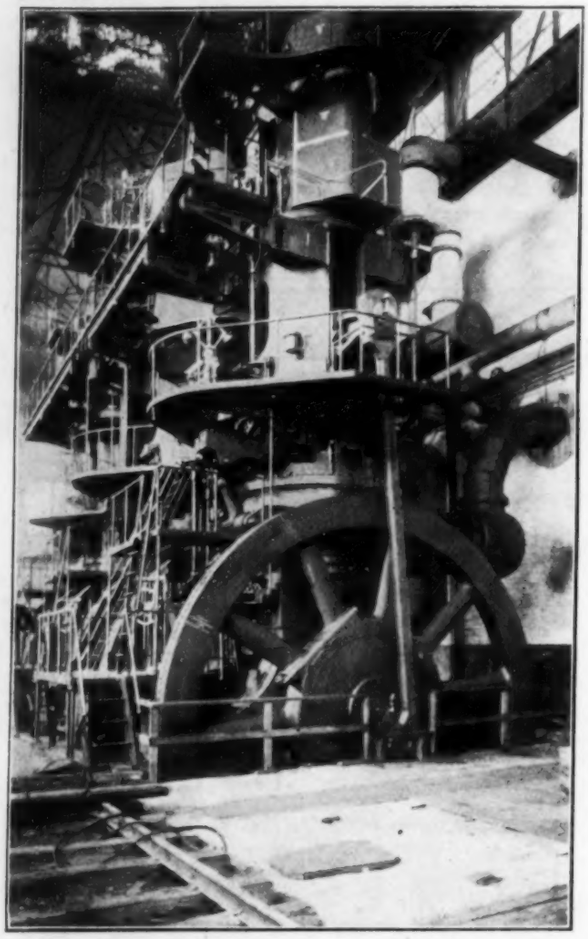


FIG. 5.—WESTINGHOUSE BLOWING ENGINES.

special design, with the steam cylinder on top and the air cylinder below. The three engines are disconnected compound, each being a separate engine, the low pressure cylinder taking the exhaust of either high pressure engine through the arrangement of piping. One high pressure engine is normally in reserve, while any one of them can be cut out at will. They have the Kennedy patent piston inlet and outlet valves. The engines exhaust into a 6,000-h. p. Worthington central elevated jet condenser.

The boilers are provided with Stilwell-Bierce & Smith-Vaile feed water heaters and Epping-Carpenter feed pumps.

The Furnace.

The stack is 85x19 feet, and is expected to produce about 350 tons of Bessemer pig daily. There are four stoves, 22x85 feet, of the Kennedy central combustion type. The double skip hoist is made by the Otis Elevator Co. under its patents and is electrically operated. It is from the special design of E. B. Clark, electrical engineer of the Illinois Steel Co., from whom the Otis Co. purchased the patents in 1902. The stack has the Kennedy improved closed top, with hydraulically operated bells and bell changing mechanism. The intention is to absorb the frequent explosions which occur with Mesabi ore, there being no explosion doors. A cast house is provided for times when it is not desired to charge the furnace product to the mixers.

The Mixers.

The mixers are of unusual capacity, to provide the great flexibility required on account of the converters being operated only single turn. The storage function, present in all mixers, is here exaggerated, and the mixers will be able to store nearly 24 hours' production of the two blast furnaces. There are two mixers, duplicates of each other, of 250 tons' capacity each, and of the Kennedy spherical type.

Instead of providing in the layout a double hoisting system, by which iron would be elevated to the mixers, and mixer metal again elevated to the converters, the elevating work is condensed so that it is all performed when the metal is elevated to the mixers, these being at such a height that no further elevation of metal is required for the converters. The 20-ton ladles as they come from the furnace are lifted by a Morgan 40-ton five-motor crane and discharged to the mixers. This crane is the equivalent of an ordinary three-motor crane, with a trolley for carrying the 20-ton ladles, and has an auxiliary trolley, for tipping the ladles. The mixers pour into a ladle car, of 15 tons' capacity at such an elevation that it is pulled on a level by a rope to a point directly in front of the converters, where the iron is emptied directly into the converter without use of a runner. In front of

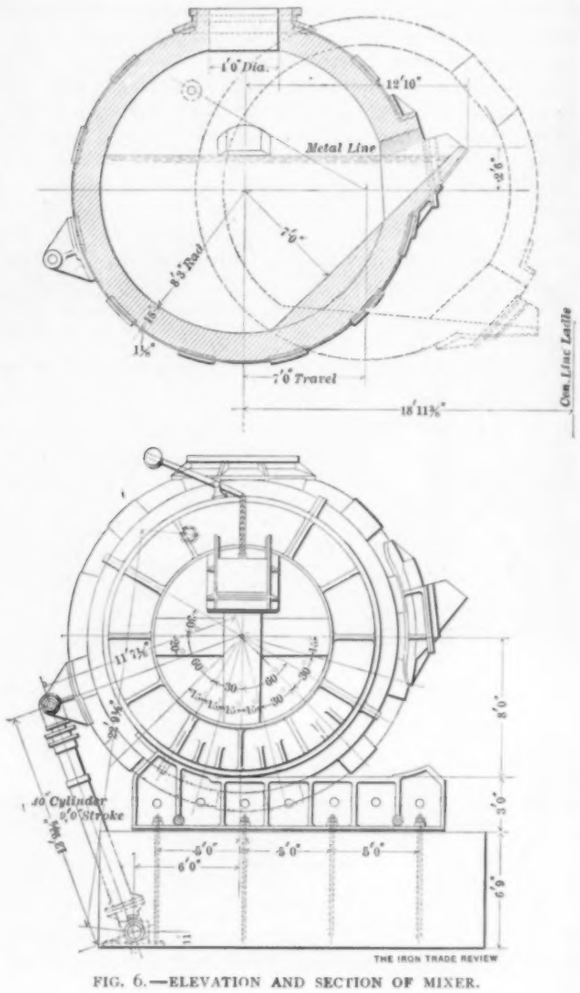


FIG. 6.—ELEVATION AND SECTION OF MIXER.

each mixer is a track scale for weighing the metal before it goes to the converters.

The Converters.

There are two 10-ton vessels, built by the Pennsylvania Engineering Co., capable of producing about 900 tons of ingots in the 10-hour day. They are blown by a Morgan Engineering Co. condensing engine with 44-inch steam and 84-inch air cylinder and 60-inch stroke, which,

as already stated, is operated by steam from the furnace gas boiler plant. The ingots 18 inch by 20 inch in section are cast on cars by a hydraulic swing crane designed by Julian Kennedy, and weigh about 5,000 pounds each. A repair shop for lining and drying bottoms and ladles adjoins the Bessemer building, being served by a Morgan overhead electric traveling crane.

Blooming Mill.

In the end of the building is the Morgan electric ingot stripper. The runway of the Morgan soaking pit crane extends to the stripper. There are six gas-fired soaking pits, four of six ingots and two of four ingots' capacity, each served by a Morgan electric charging and drawing crane. The blooming mill is a 35-inch two-high reversing mill, built by Mackintosh, Hemphill & Co., driven by a pair of 42x60 reversing engines, connected to the mill with steel gears with a ratio of 6 to 7. The blooming mill tables are also made by Mackintosh, Hemphill & Co., driven by Crane reversing engines, and are provided with the Kennedy manipulator. The blooming mill shear is made by Mackintosh, Hemphill & Co., and is capable of cutting five 4x4 billets at once. It is driven by a 75-h. p.

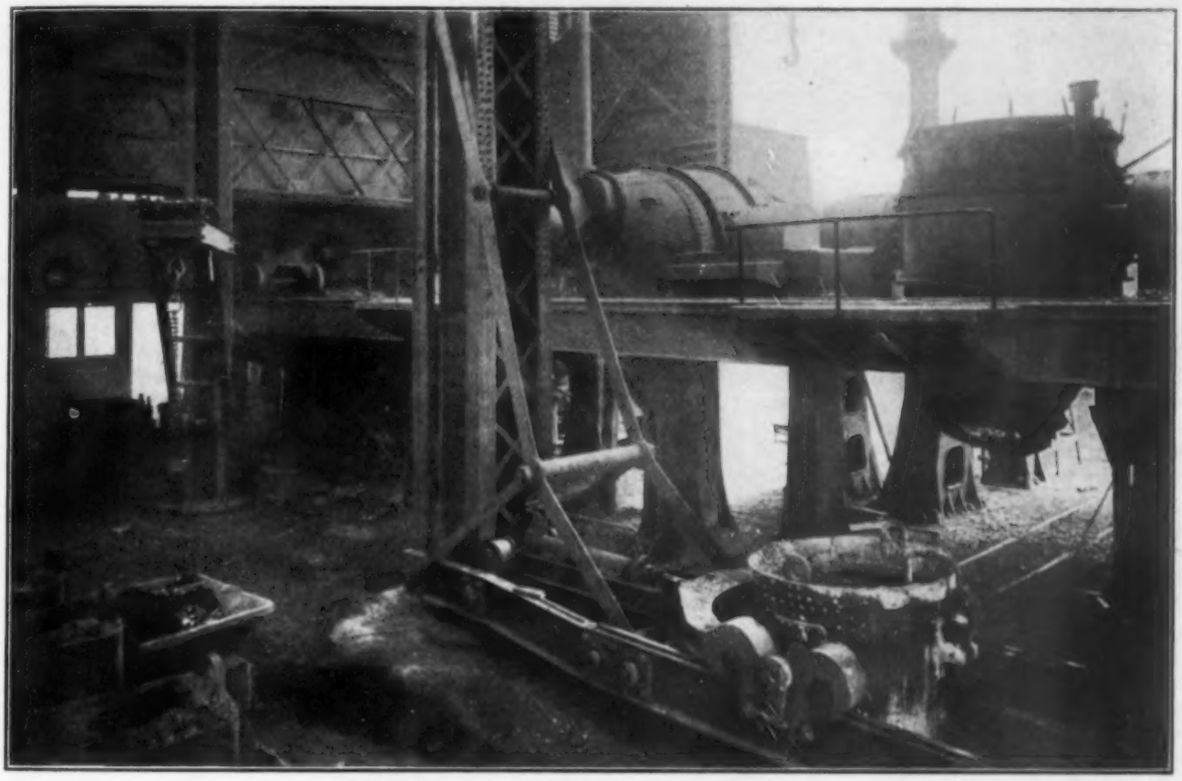


FIG. 7.—VIEW IN BESSEMER DEPARTMENT.

motor. The shear tables are also driven by motors. The entire blooming mill is served by a 25-ton three-motor Morgan crane, used for changing rolls, making repairs, etc.

Steam for the blooming mill, merchant mill, and other engines, including pumps for the hydraulic power, is furnished by a battery aggregating 3,500 h. p. of Stirling boilers, located near the blooming mill building. The boilers are provided with a 5,000-h. p. Stilwell-Bierce & Smith-Vaile feed water heater, and Epping-Carpenter feed pumps. The Tweedale water purifying system is used for these boilers as well as for those at the blast furnace power station. All the hydraulic power is furnished by two duplex non-condensing pressure pumps made by the Snow Steam Pump Works, 18 and 28x8x24 inches. The water piping was done by the Massillon Iron & Steel Co. and the steam and exhaust piping by the Best Manufacturing Co.

Morgan Continuous Merchant Mill.

The raw material of the merchant mill will in all cases be 4x4 billets from the blooming mill, in lengths of from 30 inches to 9 feet, but the mill will be operated in several different ways, according to the character of the product. Sections which are too stiff for turning in will be finished without the use of the two final finishing stands, while very small sections, constituting but a small percentage of the total output, will receive additional manipulation, involving an extra heating.

Considering first the manipulation involved in handling what will be the great bulk of the tonnage, it may be said that there is a continuous roughing mill of eight stands for reducing the 4x4 billets to any section as low as one inch square. Beyond the continuous mill, and to one side of the line of feed, is an 11-inch finishing mill of four stands, and beyond this and still further to one side is a finishing bull head of two stands. The billets from the continuous roughing mill run past the finishing train, the last end is entered in the first pass of this finishing mill, and the piece then passes through the other passes of the 11-inch mill and the two passes of the bull heads either by a back and forth motion or by turning in the end. The material is thus given 14 passes at one heating, which serves for all sizes above 7/16-inch rounds and equivalent flats, up to say ⅞-inch rounds. This constitutes the bulk of the tonnage. For larger sections some of the finishing passes are omitted, while for smaller sections, constituting a very small tonnage, a 2-inch billet is first rolled and cooled, and later is given the same passes as the 4-inch billets usually receive, involving an extra heating. All the opportunity necessary for rolling 2-inch billets on the roughing mill will be furnished during the changing of rolls on the finishing mills. The plant is thus given great flexibility without unduly swelling the first cost.

For heating the 4x4 billets, from 30 inches to 9 feet long, as they are brought in cars from the shear of the blooming mill, there are two Morgan gravity discharge continuous heating furnaces, having a capacity of 500 tons in 24 hours. The furnaces have hearths 38x10 feet, each having two Morgan continuous gas producers. Instead of the usual method of heating the air by passing it over division walls heated on the opposite side by the flue gases, the air is heated by passing it through regenera-

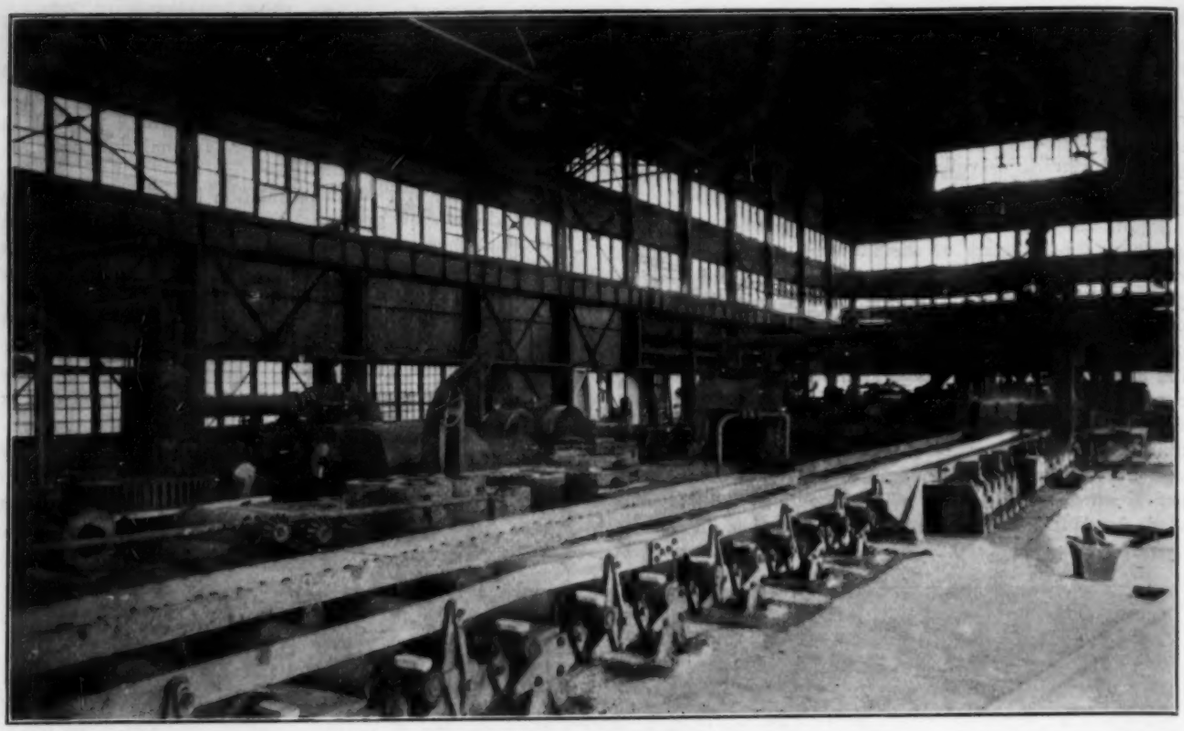


FIG. 8.—BLOOMING MILL.

tors, the same as in the Siemens furnace, thus obtaining maximum air temperatures and minimum flue gas temperatures. An ingenious and simple arrangement of slide valves operated by one steam cylinder controls the distribution of the air and flue gases to the chambers. Air is supplied to each furnace by a Sturtevant fan blower driven by a direct-connected electric motor. The side walls of the furnaces are made much thicker than usual for the double purpose of preventing loss of heat and discomfort to the workmen. Nine feet of the delivery end of the furnace hearth is made of magnesite brick to avoid the use of water cooled pipes. From the hearth the billets are pushed on to inclined water cooled pipes over which they are drawn by gravity through trap doors in the end of the furnace as cold billets are charged at the other opening, falling on to an electrically operated roller conveyor which extends to the first stand of roughing rolls, automatically entering this pass. Provision is made in each furnace for heating one line of long billets or two lines of short ones. The charging end of the furnace is raised considerably above the discharge end so that the billets pass down an inclined way to the hot end of the furnace without danger of buckling. Another important advantage of the inclined hearth, however, is that the melted cinder formed at the end of the furnace is drained off the hearth toward the discharge opening of the furnace assisted by the movement of the billets, and no cinder doors are required in the side or bottom of the furnace.

The continuous roughing mill comprises eight stands of rolls, all being 14-inch. The eight stands occupy all told a distance of less than 40 feet. They are driven

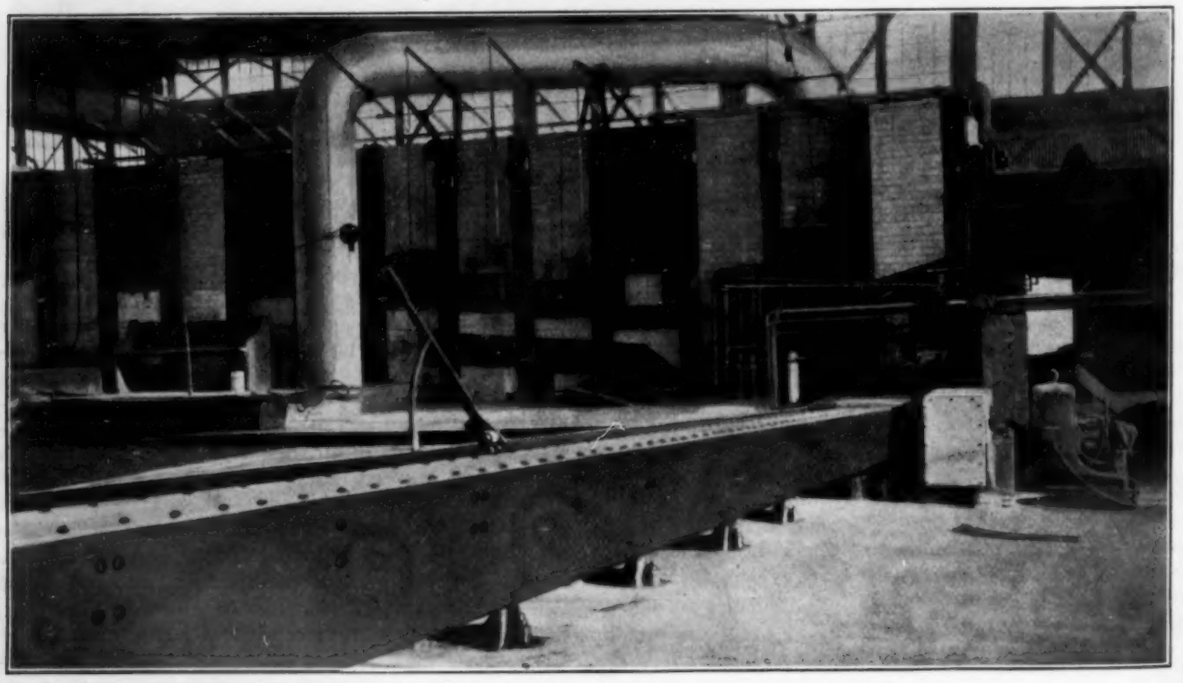


FIG. 9.—ENCLOSED LIVE TABLE FROM CONTINUOUS BILLET HEATING FURNACE TO ROUGHING MILL.

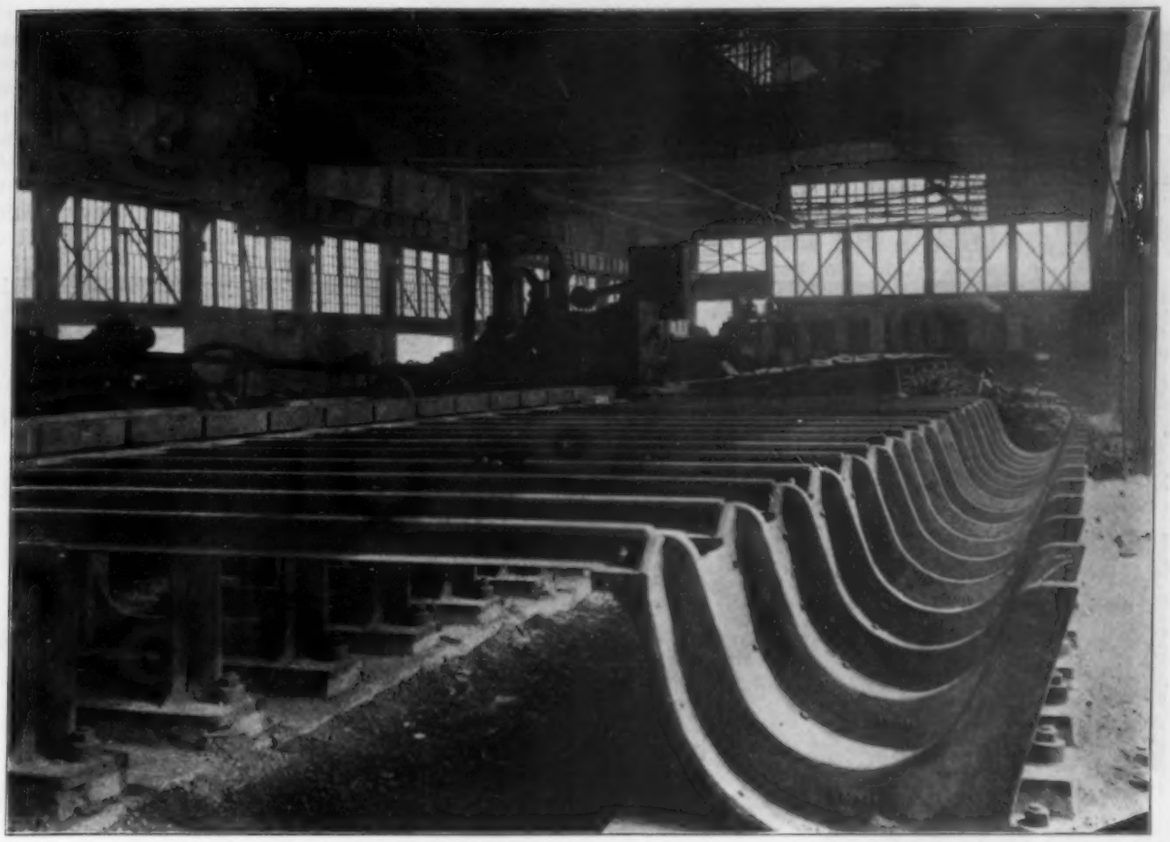


FIG 10.—SHEAR, COOLING TABLE AND BUNDLING POCKET FOR SMALL BILLETS.

through charcoal iron machine-molded spur gears on the end of the engine shaft, this engine also operating by belt the finishing stands. Since bars smaller than 7/16-inch rounds cannot well be rolled from 4-inch billets, the roughing mill passes are arranged so that 2-inch billets can be rolled at any time by simply throwing a switch, and passes are already so provided for roughing the 2-inch billet after it has been sheared and reheated.

The engine is a 30 and 54 by 60 compound condensing, made by the C. & G. Cooper Co., with a Baragwanath syphon condenser. Its shaft carries a flywheel weighing 130,000 pounds, made in segments, and 25 feet in diameter, with a 62-inch face for leather belt to drive the finishing mills.

As they emerge from the continuous roughing mill the small billets pass to a conveyor 90 feet long, driven by motor, reaching the motor-driven shear, with a capacity to cut billets 2½ by 2½, while the actual product ranges from one inch square to two inches square. Beyond the shear is the cooling bed for small billets, equipped to receive billets 40 feet long, and provided with pushers to transfer them to the receiving pocket.

For the ordinary sizes of finished product the material does not reach the cooling bed just described, but is diverted to the finishing mill.

The finishing mill consists of a train of four stands of alternate two-high 11-inch finishing rolls, driven by belt from the flywheel of the engine shaft, and two stands of 8-inch chilled rolls, these two stands being really bull heads. Two crop shears, driven from the 11-inch train, crop the ends of the piece before entering the first and third passes of the 11-inch mill. The 8-inch stands comprise one stand with rolls 7½ inches in diameter with its own stand of 7½-inch pinions, followed by one with rolls 8½ inches in diameter, with its own 8½-inch pinions.

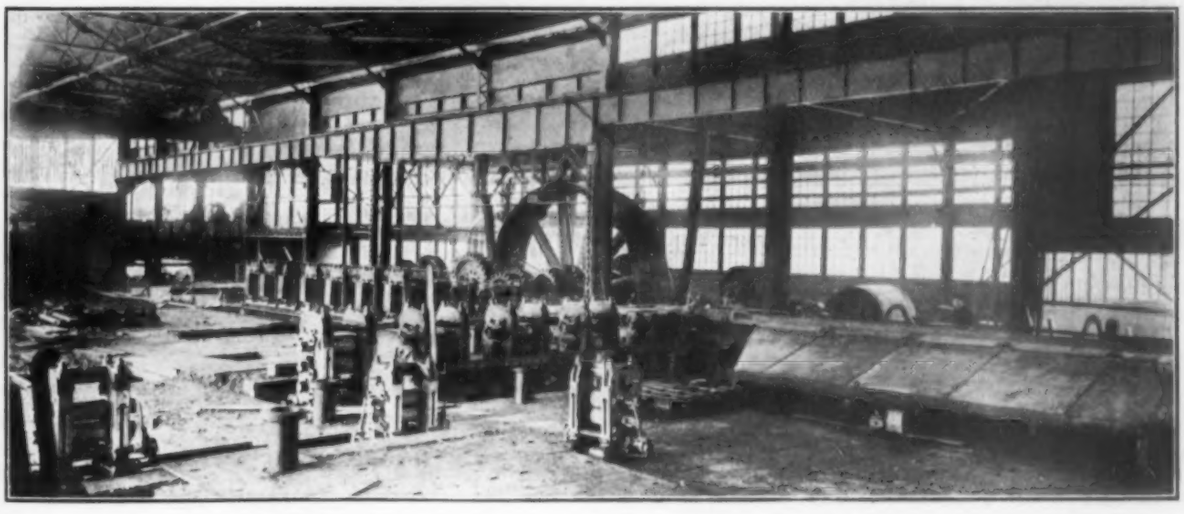


FIG. 11.—VIEW OF MORGAN ROUGHING MILL, SHOWING METHOD OF GEAR DRIVE FROM CORLISS ENGINE.

Beyond the finishing mill is the Edwards gravity cooling bed, having capacity to take bars 300 feet long, with conical feed rolls and mechanism to simultaneously shift the direction of axes of all the rolls. It is provided with a stretcher engine and opposed tail grips. There is transfer mechanism to receive the straightened pieces and convey them to the inclined cooling bed, which has an escapement by means of mechanical racking engines.

Beside the straightening and cooling bed is the driven shear table, 300 feet long, with a motor shear with capacity to cut 12 bars 9/16 inch round. The shear is provided with the Edwards adjustable gauge bar and stop. The back shear table receives the cut material, having discharging appliances and bundling pocket.

FIG. 12.—CONTINUOUS ROUGHING MILL TO LEFT, WITH PORTION OF 11-INCH FINISHING MILL IN DISTANCE.

The main building, which houses the continuous billet heating furnaces, the continuous roughing mill, the finishing mills, the shears and a portion of the straightening and cooling bed, is 80x360 feet. On the side are the gas producer house, 30x60 feet, the engine room, 30x100 feet, and the roll shop, 30x55 feet. The main building is served by a 15-ton electric crane.

Operation.

For rolling ordinary sections, i. e., those which are not too small to be rolled from 4-inch billets, and not too stiff to be turned in, the operation is as follows:

The 4-inch billets are brought from the blooming mill in standard gauge cars, the lengths being anywhere from 30 inches to 9 feet, a size shorter than 30 inches being inconvenient to work. The billets are unloaded from the cars by an electric crane, which places them on either of the tables which are located in front of each furnace and just back of the furnace pusher. These tables are at a slight elevation. One man at each furnace rolls the billets singly to a point in front of the pusher, which charges the line to the furnace, each billet charged automatically discharging one billet from the opposite end of the furnace. The billet as it leaves the furnace drops onto a live table which extends direct to the continuous roughing mill, the first pass of which is entered automatically. The eight stands of rolls in the mill are designed for a reduction of 50 percent for each pair, making a reduction for the whole mill from 4 inches square to 1 inch square. The piece leaves No. 4, 2 inches square, No. 6, 1½ inches square, and No. 8, 1 inch square. The piece as it leaves No. 8 automatically runs past the 11-inch mill on the live conveyor, and the last end is automatically entered in the first pass of the 11-inch mill. There are four alternate two-high stands, and the successive passes are given by turning in the end, or by a back and forth motion. From No. 4 of the 11-inch mill the pieces are turned in to the 7½-inch bull head, and then to the 8½-inch bull head, from which they run direct to the cooling bed, being up to 300 feet in length, where they are stopped, straightened by the stretching engine and passed down the cooling bed. Here they are assembled in groups and transferred a group at a time to the shear table, where they are sheared to exact length and pass on to the weighing pockets, where they are also bundled. Here an electric crane lifts the bundles

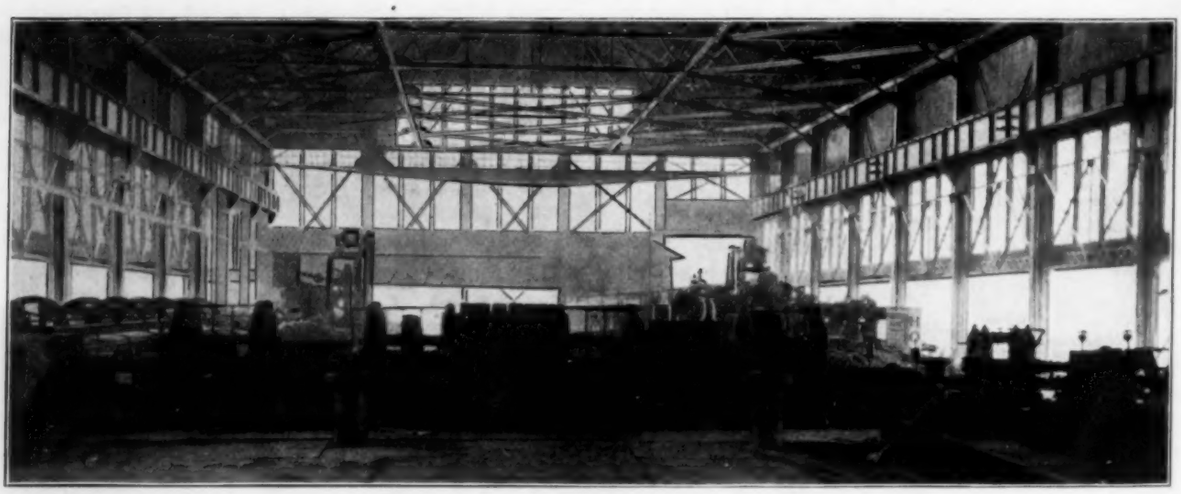


FIG. 13.—11-INCH MILL AND 8-INCH BULLHEADS. COOLING TABLE FOR SMALL BILLETS IN REAR TO LEFT, AND STRAIGHTENING AND COOLING BED FOR FINISHED BARS TO RIGHT.

to standard gauge cars for shipment to point of consumption.

For sections which are too stiff for turning in to the bull heads, the finishing pass is given on No. 4 of the 11-inch mill, whence they pass to the straightening and cooling bed.

A limited tonnage of small sections is required, under 7-16-inch rounds and equivalent flats. These it is not convenient to roll from a 4-inch billet, and provision is made to roll from a 2-inch billet. This is accomplished by rolling 2-inch billets on the roughing mill when rolls are being changed on the finishing mill. By setting off the last four stands of the continuous roughing mill, 2-inch billets are produced, passing on the live tables straight on to the small billet shear, where they are cut and passed on to the cooling bed for small billets. This bed has pushers to transfer them to the receiving pocket, whence they are taken by a crane and placed in a stock pile near the furnace.

The design of the plant throughout and the construction work in the field were under the supervision of Julian Kennedy, engineer.

The Morgan bar mill was started about the middle of last June on purchased billets, and during the past month has made over 4,500 tons of bars ranging in size from 7-16-inch rounds to 1½-inch rounds and 3-inch by ½-inch flats. The new blast furnace was blown in on Aug. 7 and the Bessemer and blooming mills were started during September and are already making sufficient tonnage to supply all the needs of the bar mill.

FIG. 14.—STRAIGHTENING AND COOLING BED FOR FINISHED PRODUCT, WITH SHEAR, BUNDLING POCKET AND STANDARD GAUGE TRACK FOR SHIPMENTS.

Differences as to the management of the Western Iron & Supply Co., St. Louis, may result in a controversy being taken into the courts. The company was organized 11 years ago, but was not incorporated until this year, when the following officers were elected: William G. Hagar, president; Andrew Thompson, vice president; John F. Donovan, secretary; Charles H. Seavers, treasurer. At a recent meeting of the board, all the officers with the exception of the president were declared deposed, and William E. Fisse and Alexander B. Scully were elected secretary and vice president. Mr. Hagar was elected treasurer instead of Mr. Seavers. The deposed officers threatened to bring action to reinstate themselves.

GERMAN IRON AND STEEL EXPORTS INCREASING.

The official report of the German Statistical Office shows that the exports of iron and steel during the first six months of this year have greatly increased while the imports have decreased. The total exports of these metals during the first half of 1900 amounted to 744,244 tons, as compared with 994,404 tons in the corresponding period of 1901, 1,503,742 tons in 1902, and 1,830,801 tons in the first six months of 1903. On the other hand, the imports have declined from 502,150 tons in the first half of 1900 to 233,690 tons in the equivalent period of 1901, and 132,610 tons in 1902, while the quantity of 133,456 tons for the first six months of 1903 indicates a very slight increase. In the case of pig iron the returns show that the imports from Great Britain in the first half of 1900 amounted to 337,581 tons, in 1901 they receded to 144,000 tons, in 1902 to 58,654 tons, and to 49,148 tons this year; whereas the exports from Germany to Great Britain during the first six months of this year amount to 12,900 tons, or practically the same as in 1902. The exports of German pig iron to Belgium exceeded 76,000 tons, to Holland 35,000 tons, to the United States 92,000 tons, and to France 14,000 tons. Of angle and T iron and steel, Germany has sent to Great Britain this year no less than 74,229 tons, as against 62,927 tons in the corresponding period of 1902, and 48,978 tons in 1901. The crowning figures relate to blooms, ingots, etc., of which 190,356 tons have been forwarded to Great Britain this year as against 157,583 tons in the first half of 1902, and 11,666 tons in 1901.

An idea of the huge cost of the construction of the new plant being built by the Rock Island Railroad, at Moline, Ill., may be obtained by the fact that the Rock Island Improvement Co., a subsidiary concern organized to build the shops, has given the Illinois Trust & Savings Bank of Chicago a trust deed for the sum of $7,500,000 to cover the cost of the construction of the works.

The sworn statements of the presidents of the Wabash Bridge Co., which recently went into the hands of a receiver at Wabash, Ind., say that the liabilities of the company are $300,000 and the assets $70,000.

THE ELECTRICAL CRISIS IN GERMANY.

The crisis through which the German electrical industry is passing has led the secretary of the German Society for the Protection of the Interests of the Manufacturers of Electrical Plants to publish a pamphlet setting forth his view of the causes of the present unsatisfactory state of the industry. There are three cardinal reasons, the secretary thinks, why misfortune has befallen manufacturers of electrical goods. Their worst sin of commission, it is said, has been the practice of electrical companies to start central power-stations for working street cars and supplying current, etc., with their own resources and money borrowed from banks, instead of treating with corporations or other public bodies prepared to finance themselves. Those manufacturers who took up the business of managing electrical tramcar lines, transmitting power, and other similar functions outside their original and proper business, not only wasted their own energy, but the diversion of capital involved crippled their original undertaking.

The second mistake, it is thought, was the ill-considered extension of operations to foreign countries and the opening of subsidiary works there. This course of action was followed especially in Austria and Russia, and although it held out much promise of success at first, difficulties arose as soon as the demand began to slacken, and were accentuated by ever-increasing competition. Furthermore, this branching out into foreign countries led the parent companies to endeavor to impose customs duties in those countries where branches had been started, and where successful, these efforts have had the effect of protecting the subsidiary concerns against the manufactures of the parent companies themselves.

A third blunder was the endeavor of the large companies to extinguish private retail enterprise by opening agencies or shops for the sale of their products in nearly all the large towns of Germany. These agencies made it their business to go to the consumer direct, and frequently undersold the local retailers. This method of doing business has naturally tended to the elimination of the middleman, whilst it has added to the ordinary risks of the manufacturer. The local tradesman (says the author of the pamphlet) knows his public, must study their requirements, humor them, and so create a demand, whereas the man in charge of a local retail establishment of a manufacturing company is usually an employe who draws his salary and does his business more or less perfunctorily.

Having indicated the causes of the crisis, the writer proceeds to ask what is the remedy for the present state of affairs. Some advocate a trust, but as this would mean the purchase of the various companies at enormous prices, the inevitable overcapitalization would almost certainly have to be accompanied by an advance in the prices of the products. These advanced prices would bring their own Nemesis by creating outside competition. A better remedy, it is suggested, would be a convention or syndicate for regulating prices, and cultivating the export trade. But the remedy most likely to be effective is that suggested by reasons given for the present condition of the trade—namely, the concentration of effort upon the manufacture only of electrical apparatus, abstention from undue industrial extensions abroad, and the abandonment of direct trading with the public. If self-denial be practiced in these three directions, the trade, it is thought, may ere long be set firmly upon its feet again. It is only by the avoidance of error that success can be attained.—[London Ironmonger.

The following companies have ordered locomotives from the American Locomotive Co.; Mexican Central Railway, 89; Buffalo, Rochester & Pittsburg Railway Co., 2; Lake Erie Railway, 10.

Four of the nine puddling furnaces of the Alan Wood Iron Co., at Conshohocken, Pa., are idle on account of lack of orders.

WESTINGHOUSE AIRBRAKE CO.

The annual meeting of the stockholders of the Westinghouse Airbrake Co. was held at Wilmerding, Pa., last week. The plan for the merger of the airbrake company and the Electro-Magnetic Brake Co. was endorsed. There was but one vacancy to be filled in the board of directors, caused by the tragic death of W. W. Card. President George Westinghouse made an official statement of the project concerning the formation of the Canadian Westinghouse Co., to take over the business of the Westinghouse interests in the Dominion. The plan was approved by the stockholders. The company will have a capital of $2,500,000. The financial details given by the president are:

The purchase of the business and plant of the Westinghouse Mfg. Co., Ltd., of Hamilton, Ont., for $650,000 in capital stock of the new company at par, the brake company to underwrite $200,000 of additional capital stock. The purchase of the patent rights and existing business of the Westinghouse Electric & Mfg. Co. in Canada for $500,000 in full-paid shares of the new company, the electric company also to underwrite $450,000 of additional stock. The sale of the remaining $700,000 capital stock at par to persons or corporations in the Dominion of Canada, which stock has already been underwritten.

The old board, with one exception, was chosen as follows: President, George Westinghouse; directors, George Westinghouse, Robert Pitcairn, H. H. Westinghouse, John Caldwell, E. M. Herr, George C. Smith, Henry W. Oliver. George W. Smith succeeds the late W. W. Card.

The financial statement shows the company to be in excellent condition. A new feature of the report is the placing of $300,000 to the credit of a special liability to cover depreciation in the plant. The report follows:

EARNINGS AND EXPENSES.

Earnings—		
Net sales brake account		$ 8,452,474 47
Gross income other sources		727,113 63
Total earnings		$ 9,179,588 10
Expenses—		
Shop—Cost of product sold	$4,916,079 36	
General and other expenses	544,428 92	
		$ 5,460,508 28
Special charges (account of depreciation, etc.)—		
Plant, property and accounts receivable		25,506 29
Total charges		$ 5,486,014 57
Credit balances—		
Credit to depreciation reserve fund	$ 300,000 00	
Credit to general profit and loss acct.	3,393,573 53	
		3,693,573 53
Total		$ 9,179,588 10

GENERAL BALANCE SHEET.

Assets—		
Cash on hand		$ 1,632,421 03
Accounts and bills receivable		3,265,305 06
Railway and other securities		1,267,411 46
Stock in associated companies		2,598,841 72
Patents at capital appraisement		2,000,000 00
Wilmerding plant		1,987,924 99
Real estate (including Westinghouse building)		1,700,000 00
Factory stores		1,765,601 61
Total assets		$16,217,505 87
Liabilities—		
Capital stock		$10,990,450 00
Rebates and accounts payable		933,155 95
Depreciation reserve fund		300,000 00
General profit and loss account—		
Balance July 31, 1902	$3,237,044 39	
Profit for fiscal year	3,393,573 53	
Total	$6,630,617 92	
Less dividend account	2,636,748 00	
		3,993,869 92
Total liabilities		$16,217,505 87

A suit has been brought for the appointment of a receiver for the Indianapolis Galvanizing Washboard Mfg. Co. The company was organized and incorporated in May this year. Only a small amount of money has been expended by the company.

The Columbia Iron Works, of St. Clair, Mich., have been declared bankrupt in the United States Court, and Harlow P. Davock has been appointed referee in bankruptcy.

Modern Cylindrical Grinding.*

BY C. H. NORTON.

There is probably no doubt that the first glimpses of cylindrical grinding came to all mechanics when using the lathe, and that these early dreams were tried here and there by mounting a small emery wheel on the toolpost of the lathe. Just where and when this was first done would be difficult to ascertain, but so far as we know the first really accurate grinding was done at Waltham, Mass., by the watch tool concerns about 1860. Mr. Webster, the father of the watch tool business, told me a few years before his death, the story of their earlier grinding. After using the lathe for some time with a small wheel in the toolpost they discovered that in order to grind tapers they should keep the centers in line; this they could not do with the lathe of that period, so they made what they called grinding lathes, that is, lathes with wheel carriage traveling on a slide that could be adjusted to an angle with the line of centers. This was sometime about 1865. These were perhaps the first grinding machines with fixed centers and traversing wheel. They were rightly called "grinding lathes." They were small, the wheel being 4 inches diameter by ⅛ face on a spindle about ½ inch diameter. The swing of these lathes was about 6 inches and the largest work done did not exceed 1 inch diameter, while the greater amount was less than ½-inch diameter.

Some time about 1865, Mr. Brown, of J. R. Brown & Sharpe, at Providence, R. I., was grinding needle bars for sewing machines with what was called a "grinding lathe," arranged for the carriage to traverse and reverse automatically. This carried a wheel 6 inches diameter by ¼-inch face. The idea of constructing a machine designed especially for cylindrical grinding and to cut entirely loose from all traditions and features of the lathe, except, of course, the supporting center points, seems to have originated with Mr. Brown; for in the years following 1865 he gave the matter considerable study, and at his death in 1876 he had invented the "universal grinding machine," which was not a lathe but had a fixed wheel and traversing work.

It is but just to note here that while great changes and improvements have been made, yet the fundamental principles he gave to the world in his universal grinding machine remain today and are used in all grinding machines made.

All through the years from 1860 to the time of the introduction of the Brown & Sharpe universal machine, grinding had been done in various shops with a lathe. The writer remembers his first experience grinding a ½-inch spindle in a 12-inch Lincoln lathe. This spindle was so far from round that it would not run, and another had to be made by turning and filing. This did run and grinding was condemned as a wrong method. This was in 1868, yet this is occurring in many shops today; that is, the attempt is still made to get something with nothing

Grinding if well done with proper tools pays big in quality and quantity, but if done with extemporized or cheap tools always falls below the common lathe work standard in quality, and costs much more. When this is understood, we can see why grinding machine makers do not build lathes with wheels mounted on them.

The Slow Appreciation of Grinding.

When we realize that some 26 years ago cylindrical grinding machines were manufactured and sold by one of the best known concerns in the world, and that 40 years ago cylindrical grinding was done successfully in some of the best known shops of the day, we cannot but feel a little surprise that after all these years so important a factor in the economical production of good machinery should be strange to so large a proportion of machine builders, and that journeymen machinists, with exceptions so few that they are noticeable, have either neglected or refused to learn to use the grinding machine. At the same time there is no tool on our lists that is held in greater awe than the grinding machine. It would seem that such universal respect would have led ere this to a knowledge of it as an essential part of every good machinist's trade and its adoption by every thrifty machine builder.

Twenty years ago grinding was considered essential to really good work by concerns that now enjoy the best patronage of the entire world, and 15 years ago they had reached the point where it was impossible to produce their work as cheaply without grinding as with it. The best grinding machines of today will produce from four to six times more work than those of 12 years ago; and yet while large numbers of American machine builders are using modern grinding machines, there is a class who demand proofs in the way of tests, etc., before they can believe that grinding is practical for their work. The reason for this condition can be traced to the fact that while there are a large number of grinding machines in use, they are "universal grinders." In fact so familiar has the "universal grinder" become, that it is very difficult for mechanics to understand that there are now in successful use cylindrical grinding machines that are not universal, and that they do not grind complicated or tool work. But they do grind all cylindrical work that is turned in lathes on two centers, and that contrary to experience with "universal grinders" they do remove considerable stock in an economical manner, saving many hours (on single pieces of work) that without their use would be expended in lathe work; for while the grinding machine, as it is generally known, has done accurate work, the preparation of work for grinding has consumed as much time in the lathe as if it were to be filed.

There are also in use many grinding machines called "plain grinders" that are simply universal machines with certain parts omitted; yet are no better than universal machines as regards efficiency.

There is in the mechanical world a common belief that it must consume more time to grind away stock than to turn it away. Therefore we find many insisting that to grind more than six or eight thousandths from the diameter of cylindrical work must be an expense, and in fact to grind at all must cost more than to turn to size in the lathe. This belief has been strengthened by the fact that grinding machines in the past have been made as producers of accurate work only with no thought as to the possibilities of reducing diameters economically.

Within the last three years there have been great changes in the design of machines and in the methods of handling work, as well as great improvements in grinding wheels. So great have been these changes and so really wonderful have been the results, that no manager can afford to judge by any experience gained by the use of machines of the older designs in the hands of operators trained under the older methods using wheels of older selection. Many years' observation leads me to believe that the neglect of the grinding machine by workmen is due largely to ignorance of it, which is possible only because of the fear to investigate.

The micrometer is held in the same combined respect and fear by a large following of proprietors and workmen. There is a very common feeling that the micrometer is a tool that is of value to others but not to him, and that its use implies more expense and greater refinement than he requires. This explains a boast by a foreman in one of our largest railroad shops recently, that they did not have a micrometer in the shop and they did not need one, as their work did not require that degree of refinement. Had this man been perfectly familiar with the micrometer and its use, he would have known that the cheapest way to measure in the world is with the micrometer, whether the work is for locomotives or for watches. It is simply a question of familiarity of the workmen with it. It is this fear that prompts the adoption of "gages" under the impression that their use is less expensive, and that workmen can with them produce better work. Yet

*Read before the Cincinnati Metal Trades Association, Oct. 8, 1903. Mr. Norton is of the Norton Grinding Co., Worcester, Mass.

men who are cast out by the tradesmen as incapable of good work are using the micrometer and producing the best work in the world at a cheap figure.

Erroneous Popular Estimates.

There is much ignorance in regard to grinding among otherwise well informed men. It is shown by expressions such as the following:

"Oh, I believe in grinding. Why I did grinding twenty years ago, and if you want nice work you must grind it."

"Oh, yes, grinding is the coming thing. We have a lathe I am going to rig up and grind all of our work."

"Yes, grinding is the modern way to do nice work and I have bought a grinding machine with six-inch swing. Just takes in my largest work."

"Yes, I know that grinding is the way to get nice work, but I cannot get any more money for my work if it is ground and cannot afford to add to the cost."

All of the foregoing show a lack of knowledge of the facts about modern grinding. It is not like it was twenty years ago. Cannot be done on a lathe "rigged up," cannot be done with a machine just large enough to swing the work and it does not increase the cost; it does decrease it.

I have spoken of the micrometer because it and the modern grinding machine are inseparable. With a few days' instruction the simplest workman without a trade gains the fundamental principles of both, and soon is able to produce more and better work than the old-line workman by the old methods. Modern grinding cannot be done without the use of the micrometer. Don't try it.

There is one feature about modern commercial grinding that is not generally understood, and that is, that sometimes really good work may not have a bright surface, and that the best work may sometimes have very broad feed lines on it.

Ground Work Need Not Be Polished.

Some of us can remember when as boys we were taught to plane work with a very fine feed and a smoothing tool, that the surface might be without mark or line and be bright. Then came the so-called Sellers feed, and we found that with it we made the best work. Now one might as well be out of the world as out of fashion of broad planer cut. The time is near when it will be as common, and quite as sensible, to do much grinding with clear broad feed lines, and much that does not shine but is nevertheless perfectly round and straight.

The overhanging arm of a milling machine should show a broad line of cut and should not shine. An engine piston rod should always show a broad line of cut. It seems evident that the piston rod will be more serviceable with such broad cut if perfectly round and straight. The feed lines are not measurable, yet they carry oil and prevent cutting until that time when use shall bring about that glaze so familiar to us all.

I once saw a scraped rod that was very successful. The broad feed line accomplishes all that scraping can as an oil carrier. One of the finest and coolest running bearings I ever saw was ground with a coarse surface and lined. It was perfectly round and straight. Its coarse and lined surface carried oil perfectly. It is necessary at present to cater to the popular notion about surface in many instances and grind much work bright and practically lineless.

Such people as boring mill makers now consent to boring bars with a uniform broad feed line. Some of the best locomotive shops are now grinding piston rods with a 1 to 2-inch pitch, clearly visible feed line. Rolls for tin foil are the other extreme and should be ground without lines and bright without grain.

Conditions of Modern Grinding.

Between the two extremes may be many different surfaces to serve the various uses. I would emphasize these facts because the popular notion has been that all ground work must of necessity be polished, or rather that no work that does not require a fine surface should be ground.

By modern commercial grinding we mean, not tool work, internal work, or complicated work, but all work produced in the lathe on two centers. It implies more than simply producing approximately perfect work; that is, round and straight with fine surface. It means sizing all round work that revolves on two centers, whether it be for refinement or simply for the removal of a small amount from the diameter roughly.

It may be interesting to know that one of the largest iron works in the country has purchased a heavy grinding machine to remove stock only, having found that they can grind 1-32 inch from the diameter of plain round work ranging from a few hundred to 6,000 pounds in weight and from two to eight feet long, in far less time than they could turn it off. The surface required is not fine, but on the contrary is rough. This is one extreme, while the grinding of rolls for mercerizing cloth is a good illustration of fine work of the other extreme.

A modern operator with a modern machine grinds both in a rapid commercial way. Rough work was never attempted by the older method and the fine work was done at large expense under the impression that it was impossible to produce it in any shorter time. This impression still prevails to a considerable extent and much that is said about modern grinding by those who know is considered fabrication.

It is perhaps a little ahead of the times, but the stories told by grinding advocates about its possibilities are not fabrications. They are the sober truth. Yet success with the grinding machine is greatest where there are loyal workmen and loyal foremen, men loyal to their employers and their own best interests. Where this is the case no one doubts the stories told of its possibilities and in many cases still better records are made than its advocates expected. It rests with the good sense of the American workmen to make cylindrical grinding a means of placing the machinery industry of America another step farther in advance of the rest of the world and themselves a large step higher in the scale of useful prosperity.

Modern grinding calls for men—good, level-headed men who can think as well as work. Cylindrical grinding presents today a vast new field for study and effort and the demand for good men is already here. Grinding pays big dividends on the investment of intelligent effort. There are few machine tools that pay as much for money invested as a really good grinding machine, combined with a really good wheel, an ambitious operator and cooperation of the lathe department.

There are few pieces of turned work that cannot be turned faster if a good grinding machine is used to size and finish them. In many cases several hours are saved in the production of a single piece.

It requires intelligent management of lathe work to get the best out of the grinding machine; but this is an age of intelligent management of specialties, and there is no one specialty in machine manufacture that shows a larger field for profitable work than the production of round pieces.

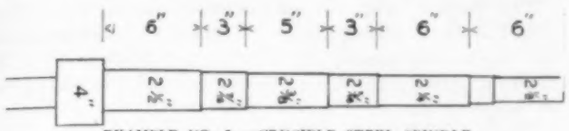
Round pieces make up a large proportion of all machinery and we cannot afford to let time-honored methods and our veneration of the lathe stand in the way of large saving.

Preparation for Grinding.

To prepare work for modern commercial grinding, it is necessary to simply turn it to within 1-64 inch or 1-32 inch of size and the feed of lathe can be very coarse, thus reducing the time of turning enormously. Some idea of the time saved by this method can be obtained by noting the time required to turn off a finish chip with a feed of 60 per inch and then the same chip with a feed of eight per inch. Again note the time taken to turn a piece of work nice and straight to within a few thousandths of size and the time of turning the same piece to within 1-64 inch to 1-32 inch of size. The saving in time by this method of turning, combined with good grinding machines and wheels, amounts in many cases to from one to eight

hours for a single piece of work, and shows a saving of many thousands of dollars when applied to the output of cylindrical work of an entire works. The cost of machines and wheels melts into insignificance before the saving on single pieces.

The wheel plays an important part in modern grinding. We used to think of an emery wheel as wearing off the stock. Grinding? Grinding? Can you think what grinding is? A look at the grinding chips through the microscope shows us that grinding is simply cutting, as the



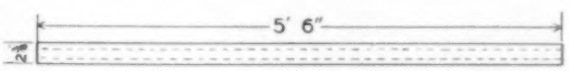
EXAMPLE NO. 1.—CRUCIBLE STEEL SPINDLE.

chips are curly and look like all chips from cutting tools.

The modern grinding wheel is really a great milling cutter with millions of teeth that cut until they are nearly worn out, and as they wear off are constantly supplemented by others whose sharp edges or points are on a thousand different radii, several thousand being ready sharpened for work the instant dulling of others occurs; and as the supply of these teeth is endless as long as the wheel lasts, we have millions of cutting teeth in contact with work each minute. It is common to have 9,000,000 cutting points per minute and in some cases we have 18,000,000 cutting points per minute.

Lubricants.

The chips seen under the microscope are different sizes and shapes. This is because the teeth that cut them are of many different sizes and shapes on their cutting edges. When we find many different sizes and shapes of chips we know that our wheel is made of more than one size of grain, viz., a combination wheel. When we find the chips nearly all alike we know that they were made with a wheel of not more than one size of grain. Knowing as we now do that modern grinding wheels are milling cutters, cutting off a curly chip, we must certainly use some form of lubricant to longer preserve the edges of the teeth, and decrease the power required to do the work. So we use water, soda and oil—water to carry away the heat and prevent the work from changing shape,



EXAMPLE NO. 2.—STEEL BAR.

soda to prevent rusting of work, and oil to lubricate the teeth. This cooling lubricant increases the cutting power of the wheel and thereby the product.

There are those who say that clear water is necessary to clean cutting of the wheel and that soda water and oil clogs and fills the wheel and prevents free cutting, but they evidently have come to such conclusion without careful scientific investigation; for it is positively certain that a lubricant of water, soda and oil does increase the cutting and decrease the power required. Never was there a time when such careful and intelligent study was given to the design and construction of grinding machines and grinding wheels as now, for those near to this field know how important it is.

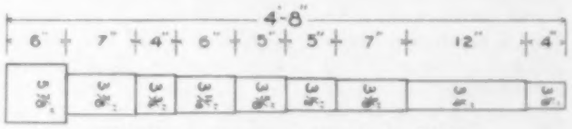
Care in Manufacture of Wheels.

The wheels are carefully adapted to the machines and the machines to the wheels and work to be done. The apparently simple grinding wheel is now made by careful scientific methods with elaborate laboratory tests for all material and mechanical tests for finished wheels.

The machine has embodied in its design and construction much that mechanics in other lines do not see or understand; and though to the ordinary observer it is out of sight, it is essential to rapid and accurate work. This explains the reason for the numerous failures of grinding enterprises where machines have been extemporized out of the lathe or designed by those not taught by years of experience that infinitely small things in design and construction affect results.

The well designed and constructed grinding machine enables us to produce as perfect work on the piston rod for a monster steam ship engine as we have formerly done on the needle bar of a sewing machine. The needle bar has for years been ground to .00025 limits. Who would have thought until recently that a rod 12 inch diameter and 12 feet long could be made to a .00025 inch limit, to say nothing of doing it at a great saving of time. Yet such is the case and with work of those large dimensions the saving in time becomes considerable. It is easily practical to save from three to four days of lathe work with one day's labor on the grinding machine, with the present knowledge of such work; which will be developed rapidly in the next two years as larger and heavier machines are now being installed. The first to install these larger, heavier and more accurate machines were the shipbuilders on the Clyde. The economy possible by the combination of the modern grinding machine, the modern grinding wheel, the modern high speed steel, the modern lathe and the thinking loyal American workman, is vastly greater than we can now estimate.

With the hearty co-operation of the lathe man using



EXAMPLE NO. 3.—CRUCIBLE STEEL SPINDLE.

modern steel and heavy lathes, the grinding machine shows a saving of time so great that few will believe the records that have been made.

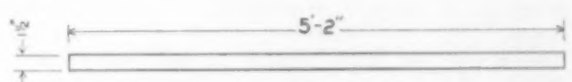
Modern steels, modern lathes, modern grinding machines and modern grinding wheels present to the American employer and employe, who will work together and think while they work, an opportunity for advancement and profit to both than can easily place them beyond the competition of the old world for years to come, and enable them to sell their product abroad even with retaliatory tariffs added.

Saving by Combining Lathe and Grinder.

Some idea of the saving by the combination of lathe and modern grinding machine can be had by studying the following examples of work. These examples are taken from many pieces of work done at one of our representative shops with a modern plain grinding machine, in connection with cheap turning.

No. 1. *Crucible Steel Spindle.*—Ground to fit rings, very accurate. Time 1 hour. Turned in 1 hour and 30 minutes. Old time of turning when prepared for grinding with an old-line machine was 3 hours to 4 hours. It was then ground in 3 hours and 30 minutes. Total time by old method, 7 hours and 30 minutes. Saving by new method 5 hours on one spindle.

No. 2. *Steel Bar.*—Ground to standard ring, time 1



EXAMPLE NO. 4.—SOFT STEEL SHAFT.

hour and 20 minutes, turned ready for the grinder in 1 hour. Total 2 hours and 20 minutes. Old time of turning was 3 hours and 30 minutes. It was then ground with an old-line machine in 2 hours and 30 minutes; total 6 hours. Saving 3 hours and 40 minutes on one bar.

No. 3. *Crucible Steel Spindle.*—Ground complete, 1 hour and 25 minutes; turned ready for grinding in 2 hours. Total 3 hours and 25 minutes. Old time of turning was 5 hours; it was then ground in an old-line

machine in 4 hours and 30 minutes. Total 9 hours and 30 minutes. Saving was 6 hours and 5 minutes on one spindle.

No. 4. *Soft Steel Shaft.*—Ground to a limit of .001 inch, not turned but ground direct from the black bar removing 1/16 inch from the diameter. Time 45 minutes. This is a slender piece to turn in the ordinary way and illustrates the saving with one piece only, as the lathe man would require from 2 to 4 hours to produce it to these limits. Note the possibilities when the steel is rolled to 1/32 inch above size instead of 1/16 inch as now found in the market. Also note the saving in steel on large numbers. With 1/32 only to grind off the time would be reduced to 25 minutes.

These examples show what can be accomplished with single pieces. There is a prevailing belief that grinding does not pay except with quantities of duplicate work. Every-day practice proves this belief to be without foundation, and the modern grinding machine with modern grinding wheels stands ready to take to a finish still cheaper turning than has yet been done, and we await the more general introduction of heavier lathes to give us still cheaper turning.

Another Railroad Industrial Department.

A factor of importance in latter-day railroad operations is the industrial department, which has for its purpose the further development of the territory traversed by the railroad. Such a department has been established by the Erie Railroad and it is in charge of Luis Jackson, with the title of industrial commissioner and offices at 21 Cortlandt St., New York. Through the work of this department the Erie Railroad seeks to increase the number of manufacturing plants on its system, furnishing the manufacturer with information bearing on his particular industry. The department districts all the territory traversed by the railroad, according to adaptability, markets and advantages for manufacturing, and advises with new companies or those seeking new locations as to places most suitable for their operations. The natural advantages offered by towns on the Erie Railroad, in New York, New Jersey, Pennsylvania, Ohio, Indiana and Illinois, include deposits of anthracite and bituminous coal, oil, natural gas, sewer pipe clay, fire and other clays, cement material and building stone. Another feature of the industrial department is to make the manufactured products of the towns on its line more widely known in all markets.

An immense artificial cascade has been determined upon by the authorities of the Louisiana Purchase Exposition as the centerpiece of the semi-circular lay-out of the principal buildings. The cascade will be divided into three parts—a large middle cascade with a smaller one at each side, the water flowing directly into the head of the grand basin. About 90,000 gallons of water per minute will be supplied at a head of 159 feet, forming the greatest artificial water effect ever attempted. The water will be taken from the grand basin itself and will be raised to the top of the cascade by a pumping station located under Festival Hall. The pumping machinery will consist of three 36-inch single-stage turbine centrifugal pumps purchased from Henry R. Worthington of New York, each driven by a 2,000-h. p. Westinghouse alternating current motor. The total horsepower utilized will thus be 6,000, making this the largest electric pumping station in the world. The machinery for this plant is now being installed at St. Louis.

The Stanley Electric Mfg. Co., of Pittsfield, Mass., announces the opening of two new sales offices, one at Cincinnati, with headquarters in the Perin Building in charge of O. H. P. Fant, and the other in the Century Building, St. Louis, in charge of F. Johnson.

The Acme Machine Works, Goldsboro, N. C., of which J. J. Street is the president and principal owner, has made an assignment. The liabilities amount to about $15,000.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Sharpe Machine Co., Quincy, Ill., capital $3,000, has been incorporated to manufacture metal working tools and machinery. The incorporators are: Joseph W. Sharpe, William F. Meyercord, Elizabeth Sharpe.

The Darrow Mfg. Co., Minneapolis, capital stock $35,000, has been incorporated to manufacture attachments for typewriting machines. The incorporators are: N. C. Darrow, Robert N. Whyte and Edward L. McCrary, all of Minneapolis.

The Brunk Machine & Forge Co., Lorain, O., capital $25,000, has been incorporated to do a general machine and forging business. The incorporators are: Philip Brunk, W. M. Dabney, G. A. Resek, A. V. Hageman and J. M. Jones.

The Merrimack Iron Foundry firm has been incorporated and is now a corporation with a capital of $60,000, Mrs. Sarah C. Joslyn is president and Clarence H. Joslyn is treasurer and manager. The plant is located in Lynn, Mass.

The Reynolds-Chalou Foundry Co., of Troy, N. Y., has been incorporated with a capital of $20,000, and intends to manufacture castings, stoves and heaters. The directors are: John Reynolds, of Troy, Michael Fallon and James B. Eagan, of Watervliet, and William Quillinan, of Cohoes.

The Badger Steel Roofing & Corrugating Co., of La Crosse, Wis., was organized with a capital of $20,000.

The Kentucky Anchor Fence Co. has been organized at Owensboro, Ky., with an authorized capital of $100,000. The promoter is J. B. Sturtevant, Brandon, Manitoba, who is to be the general manager.

The Canton Steel Ceiling Co., of Hartwick, N. Y., has been incorporated with a capital of $5,000. The directors are: J. W. Yohe and E. M. Fritts, of New York City, and A. B. Clark, of Canton, O.

The Central Car & Foundry Co., Irvona, Pa., has been incorporated with a capital of $25,000. The incorporators are: Elmer E. Helman, George W. Flowers, Frank Gregg, Irvona.

The National Steel Castings Co. has been incorporated under the laws of Delaware by H. Lindale Smith, J. R. McQuigg and W. B. Newcomb, all of Cleveland, with a capital stock of $160,000. The company will manufacture light steel castings, having purchased the buildings erected at Ravenna, O., by the American Foundry & Machine Co. The new company's Cleveland offices are with Riley & McQuigg, Williamson Bldg.

G. H. Hall, Red Springs, N. C., will buy 9x12 engine and boiler to match same.

J. W. Kohn & Co., 14 Merwin St., Cleveland, is in the market for 150 to 200-horsepower plain slide-valve engine.

Moore Lime Co., Richmond, Va., wants 10-horsepower center-crank horizontal engine.

Battery Machinery Co., Rome, Ga., is in market for 300-horsepower second-hand Corliss engine for immediate delivery.

The town of Waycross, Ga., will be in market for gasoline engine of 50 or more horsepower; also two large air compressors.

The Monarch Blast Furnace Co., John Gaffney, president, Liberty Furnace, Va., wants prices on blowing engines, air compressors, drills, fire-brick and dynamo to furnish 500 lights of 16 candle-power.

Pressed steel shells for use in the army and navy of the United States and other countries, will be manufactured in Milwaukee, after the first of next year, by the American Standard Steel Fitting Co., recently incorporated with $100,000 capital stock. The incorporators are F. B. Giesler, Daniel Homer and Joseph Schurek.

The company has purchased a piece of land 120x200 feet, and work upon the plant will be begun as soon as bids are received.

The Comstock Sash Lock & Novelty Co. has been organized at Ann Arbor, Mich., with a capital stock of $20,000, divided into 2,000 shares of $10 each, of which $7,125 has been paid in.

The Treece Implement & Vehicle Co., St. Louis, has been incorporated with a capital of $10,000, for the manufacture of farm implements and machinery.

The Reliance Pneumatic Tool Co., St. Louis, has been incorporated with a capital of $50,000, by W. D. Pittman, B. J. Buss, of St. Louis, and J. B. Buss, of Jennings, Mo.

The Toledo Light Castings Co. is the name of a new concern which is now being organized at Toledo, O. The company will be capitalized at $10,000, of which one-third has been subscribed. The product of the company will be light castings in iron, aluminum and brass.

The Geo. M. Garland Co., Desplaines, Ill., capital $30,000, has been incorporated to manufacture iron and metal goods.

The Mudd Mfg. Co., Chicago, capital $25,000, has been incorporated to manufacture metal articles.

Fires and Accidents:—

The Morganfield Machine Shops, Morganfield, Ky., were destroyed by fire a few days ago. The loss on machinery and buildings is estimated at $8,000; insurance, $4,000.

The Gendron Wheel Co.'s plant, Toledo, O., was damaged by fire Oct. 3, with a loss of $2,500. This is the fourth time within a year that the plant has been visited by fire.

New Construction:—

The Grays Harbor Iron Works, Hoquiam, Wash., is enlarging its plant and installing a traveling crane. The floor capacity has been doubled.

The Chambersburg Engineering Co., Chambersburg, Pa., has purchased a tract of 7 acres, and expects to build an addition to its plant.

Ground was broken Oct. 10 for the new plant of the Denver Steel Castings Co., heretofore mentioned. The foundry will be 130x247 feet; the machine shop, 40x95 feet, and there will be a number of other buildings.

The plant of Francis Smith & Co., manufacturers of sheet iron and steel pipe, San Francisco, which was destroyed by fire Sept. 17, is being rebuilt. The size of the building will be 200x250 feet.

The Novelty Iron Co., Canton, O., whose plant was partially destroyed by fire recently, advises us that the destroyed building will be rebuilt, and although at this time plans have not been fully developed, the company anticipates that the new buildings will be larger and better than the old. The company is now running full, as the fire did not delay the production of its goods. All orders are being filled promptly.

Kilpatrick Bros. & Collins, the railroad builders, have commenced active operations upon the construction of their repair shop at Beatrice, Neb.

Work on the new mills of the Dominion Steel & Iron Co., at Sydney, Cape Breton, is nearly completed. It is announced that finished steel products will be turned out before the close of the year.

When the car shops of the Lackawanna Railroad at Scranton are finished, the company will have a plant covering 158,400 square feet, equipped with every modern appliance for repairing rolling stock. In addition to two freight car repair shops covering 60,000 square feet, there are numerous other buildings, including a power house, affording every facility for rapid repair of equipment.

The Safety Steel Derrick Co., Bowling Green, O., has been doing a prosperous business in its short career, and is now considering plans for increasing its output.

The Platteville Foundry & Machine Co., Platteville, Wis., will erect several new buildings as additions to its plant. At a recent meeting of the stockholders, the following directors were elected: W. G. Bryant, Morton Eastman, Geo. D. Orput, C. A. Burroughs and B. F. Huntington. The following officers elected are: W. G. Bryant, president; B. F. Huntington, vice president; Morton Eastman, treasurer; and W. C. Johnson, secretary.

James H. Paine & Son Co., of Boston, is erecting a plant at Groton, Conn., for the manufacture of engines. About 100 men will be employed.

The new foundry of the D. E. Whiton Machine Co., New London, Conn., manufacturer of chucks, has been completed, and a force of molders was put to work last week.

The Sutherland Wire Fence Co., of Minneapolis, will build a Canadian branch plant at Windsor. The decision to select Windsor was the result of the activity of John Curry, a prominent banker of that city.

The Hammond Iron Works, Warren, Pa., has adjusted its loss from a recent fire, and a large force of men is now engaged in cleaning up the debris preparatory to the rebuilding.

The improvements now in progress at the Oswego, N. Y., plant of the Railway Spring Co. are extensive. They will cost in the neighborhood of $200,000, and will include the building of a power plant at a cost of $10,000, and the installation of machinery at a cost of $50,000. It is expected that the company will have the enlarged plant in operation by Jan. 15.

The new plant of the Richland Foundry Co., Belleville, Ill., destroyed by fire a few months ago, has been rebuilt and the first heat was taken off last week.

The Lattimer-Williams Stove Co., of Columbus, O., has been making extensive improvements in its plant. It has taken over the building recently occupied by the Kentucky Extract Co. and is remodeling it into a stove plant.

The John Rice Foundry & Machine Co., Stevens Point, Wis., will erect a two-story brick addition, 20x60 feet, and will put in a ten-ton cupola and other equipment.

Surveys are being made for the new warehouse and addition to the machine shops of the Pennsylvania Railroad at Harrisburg, Pa. The structure will be one story, 253x73 feet. It will be of frame and corrugated iron construction.

The Ashland Steel Range Co., of Ashland, O., is preparing to add a foundry to its plant, located on the Erie Railway, that city. The building will be 55x100 feet.

The new Vulcan foundry at Winnipeg, Manitoba, is nearing completion, and it is expected to be ready for occupancy about the middle of next month.

The Racine Boat Mfg. Co., located at Muskegon, Mich., expects to have its new foundry in operation by Dec. 1. The building is 104x116 feet. It has also constructed several other new buildings.

The new brick foundry and machine shop at the Sharples Separator Works, West Chester, Pa., is under roof and will soon be completed.

The foundry of the Ingersoll-Sargent Drill Co.'s plant at Phillipsburg, N. J., is practically completed. The old foundry at Easton, Pa., will be torn down and some of the brick in the buildings used in the construction of the new plant at Phillipsburg.

The McCadden Machine Works, St. Cloud, Minn., is building a foundry, in which it will make its own castings. The company has formerly had its work done by contract.

A. M. Smith, Dixon, Ill., inventor of hoisting machines and elevators, contemplates establishing a foundry at either Dixon, Ill., or Sterling, Ill.

The Blackwood Coal & Coke Co., Blackwood, Va., has let a contract for the building of 250 coke ovens to J. A. L. Minor, who also has a contract to build 300 coke ovens for the Virginia Iron, Coal & Coke Co.

John Rourke & Co., Savannah, Ga., will rebuild at once machine shops and marine ways, recently burned, at a loss of $125,000.

The Gulf, Colorado & Santa Fe Railroad will build

roundhouse and machine shops at Houston, Texas. The general manager is W. C. Nixon, Galveston, Texas.

Burr & Co., Champaign, Ill., are erecting a machine shop, to be two stories, and modern in every particular.

The American Frog & Mfg. Co., Kansas Ctiy, Mo., whose machine shop was burned recently, advises us that it is rebuilding with the same dimensions as before, 100x100 feet. The plant will be in operation within two weeks, as the power plant was not injured to any great extent.

The Pittsburg and Valley Districts:—

The Aetna-Standard plant of the American Sheet Steel Co., Bridgeport, O., is idle for an indefinite period.

The report that the Struthers, O., plant of the American Sheet Steel Co. would shut down for an indefinite period, has been officially denied. The plant is in operation and from indications will continue to operate without interruption.

The new plant of the Damascus Brake Beam Co., Sharon, Pa., will be placed in operation shortly. All of the machinery is in place and the buildings are completed.

The plant of the Hockensmith Wheel & Mine Car Co., Irwin, Pa., was destroyed by fire last week, entailing a loss of $50,000. The buildings destroyed consisted of a foundry, machine shop, pattern shop and power plant.

It is reported from Niles, O., that the plant of the American Tin Plate Co. at that place will be removed to Sharon, Pa., and the machinery set up in the South Sharon plant operated by this company.

The twenty mills of the South Sharon plant of the American Tin Plate Co., South Sharon, Pa., are again in full operation.

The 35 and 40-inch mills of the Homestead plants of the Carnegie Steel Co. will be idle only the present week, and President Dinkey is authority for the statement that they will again operate in full next week. These mills have been shut down from time to time during the past three or four months and the present idleness is nothing unusual. The 10, 23 and 33-inch mills at Homestead which were only operating on a single turn for some time were put on double turn this week.

The building of two domes for the observatory of Amherst College, Amherst, Mass., one 19 feet in diameter and the other 33 feet, has been awarded to W. N. Kratzer & Co., 3214-30 Smallman St., Pittsburg. This firm has recently constructed and erected on Allegheny Observatary one dome 33 feet and one 27 feet in diameter, besides furnishing and erecting other steel work required in connection with the observatory and transit building.

General Industrial Notes:—

The motor department of the Stanley Electric Mfg. Co., of Pittsfield, Mass., will henceforth be in charge of Mr. A. W. Henshaw, formerly of the General Electric Co., Schenectady, N. Y.

The foundry department of the Holly works at Lockport, N. Y., is being removed to the Snow Steam Pump Works of the International Steam Pump Co. at Buffalo. The transfer will be complete by Nov. 1.

The Canadian Westinghouse Co., Ltd., with a capital of $2,500,000, was organized last week at Hamilton, Ont. The following officers were elected: George Westinghouse, president; H. H. Westinghouse, F. H. Taylor, vice presidents; P. J. B. Myler, general manager and treasurer; John H. Kerr, secretary.

As a step in connection with the recent agreement of the Eastern manufacturers of pig iron, the blast furnace at Port Henry, N. Y., owned by Witherbee, Sherman & Co., and operated by Pilling & Crane, of Philadelphia, has been shut down. Mr. Pilling has denied the report that $60,000 is to be expended in remodeling the plant.

The Holly Mfg. Co., manufacturer of pumping engines, is to be removed from Lockport, N. Y., by the International Steam Pump Co. Some time ago the latter company moved the clerks and managers of its constituent company at Lockport to the Snow Pump Works at Buffalo. An order was issued a few days ago to take the foundry department to Buffalo by Nov. 1.

The foundry at the plant of the Fountain City Drill Co., La Crosse, Wis., is now in operation, after being closed for several months.

The Enid Machinery & Supply Co., Enid, Oklahoma Territory, recently incorporated with a capital of $25,000, is the consolidation of Olinger & Jett, repairers of bicycles and light machines, and Amos Funk & Son, manufacturer's agents. Both of these firms have been in business at Enid for the past three years, and the business done in the past by both will be carried on by the new company on a larger scale. The company will have a thoroughly equipped machine shop and a small foundry, and will handle engine and thresher suplies in a wholesale and retail way. The company makes a specialty of gasoline engines, power plants and power vehicles. It will build a warehouse 25x100 feet, to be used in conjunction with its present warehouse, 25x60 feet.

The Sinuous Tube Boiler Co., Toledo, O., recently incorporated, is at present doing only repair work, but its aim is to build a boiler for which it has a patent. Its plans for the future have not been matured.

The Brown Hoisting Machinery Co., Cleveland, is about to make a shipment of furnace hoisting machinery for installation in the plant of the Ebby Vaile Iron & Steel Co., Wales.

The Richmond Foundry Co., of Astoria, Ill., opened its new foundry Sunday, Sept. 27, by giving a reception to its employes and friends. The next day work was begun in the new plant.

The Cheraw Machine & Foundry Co., Cheraw, S. C., has succeeded the Cheraw Machine Works, of which Mr. W. G. Howard has been owner and proprietor. Mr. McPherson, an experienced mechanic of North Carolina, has become the manager, and Mr. J. W. Maynard, treasurer, while Messrs. William Godfrey and J. P. Maynard are directors.

The Fischer Foundry & Machine Co., Pittsburg, manufacturer of rolling mills, glass works and general machinery, has purchased from C. C. Wais, Cincinnati, O., all patterns, patents, drawings and good will pertaining to his shear and punch business. The new company will continue the manufacture and sale of these goods on a larger scale than heretofore. Mr. Wais will have charge of the shear and punch department.

The Toledo Stove Co., Toledo, which recently increased its capital stock from $100,000 to $500,000, does not intend to enlarge its plant, as it is large enough. The plant has been running only about one-half of its capacity; but the company intends to run full capacity by the first of the year.

The Hubbard Saw & Tool Works, Menominee, Mich., has been sold to F. G. Fernstrum, boiler manufacturer, who in turn sold the machinery to Andrew Gram, who will use it in his machine shop. The plant has been in operation for about 10 years.

The Atlantic & Birmingham Railroad Co. has removed its machine shops from Moultrie, Ga., to Fitzgerald, Ga., and will make some improvements. The superintendent is Alex Bonnyman, Waycross, Ga.

The property of the Juragua Iron Co., Ltd., has been sold at auction in Philadelphia. The purchase price was $625,250 and the purchaser was the Bethlehem Steel Co. The sale was a mere formality, the period of corporation having expired. The company was the pioneer in developing and operating mines in Cuba.

The Franklin Rolling Mill & Foundry Co., Franklin, Pa., is making active efforts to obtain export trade in steel poles for electric power, telephone and telegraph lines Rogers Son & Co., of London, have been appointed British agents, and Isaac M. Hutchison, Mexico City, to look after Mexican orders.